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Digital Stories Students Tell: An Exploration of Doctoral SLA Students' Beliefs about Storytelling and Educational Technology

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Digital Stories Students Tell: An Exploration of Doctoral SLA Students' Beliefs
about Storytelling and Educational Technology

by

Patrick Mannion

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Second Language Acquisition and Instructional Technology
Department of Teaching and Learning
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teacher education, multimodal analysis

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DEDICATION

I dedicate my dissertation to my family, friends, classmates, and faculty in the College of Education at the University of South Florida, all of whom have provided me with invaluable support throughout my studies.

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First of all, I want to thank my major professor, Dr. John I. Liontas, for all his kind support before and during the dissertation writing process. I truly appreciate all the time and effort he devoted to helping me. Without his kind help and guidance this dissertation would not have been possible. He has also inspired me to become a better teacher, researcher, and writer. I would also like to thank Dr. Janet C. Richards for her help and support before and during the writing process. In addition to her help in some difficult times during my studies, Dr. Richards' dedication to her work inspired me and led me to develop an interest in qualitative research. I also have much gratitude toward my other dissertation committee members for their support during my time as a student at USF and for help with writing my dissertation. In addition to kindly helping me with various aspects my dissertation, Dr. Park has inspired me to learn more about educational technology. Dr. Philip Smith has helped me not only in my doctoral studies, but was also my advisor during my M.Ed. program. I have sincerely appreciated his kind support.

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LIST OF ACRONYMS

AI	Artificial Intelligence
AR	Augmented Reality
CALL	Computer-Assisted Language Learning
CAT	Computer-Adaptive Testing
DS	Digital Storytelling
DS+	Digital Storytelling With a Twist
EAP	English for Academic Purposes
EFL	English as a Foreign Language
ELL	English Language Learner
ESL	English as a Second Language
ET	Educational Technology
FL	Foreign Language
L1	First Language
L2	Second/Foreign Language
LMS	Learning Management System
MALL	Mobile-Assisted Language Learning
SFL	Systemic Functional Linguistics
SLA	Second Language Acquisition
TPACK	Technology, Pedagogy, and Content Knowledge

VR

Virtual Reality

ABSTRACT

Educational technology (ET) plays a major role in second/foreign (L2) language teaching and learning. Some factors influencing the ways in which teachers employ ET in L2 education are the teachers' personal beliefs about how teachers and students should use ET to learn target languages. To develop a better understanding of influences on L2 teachers' ET-related subjective positions, a need exists to explore the ET-related perceptions and beliefs of current and future teacher educators who are, or will be, responsible for the design and implementation of curricula and learning activities in teacher education programs. In these teacher education programs, future teachers are likely to gain knowledge about and experience with various types of ET. However, scant research appears to exist on the perceptions of doctoral students in the field of second language acquisition (SLA) and ET regarding the use of ET in L2 education. To add to the extant literature, I conducted research that focused on doctoral students who were enrolled in a course on these same topics (i.e., ET and SLA). Specifically, I explored their discussion thread posts and digital stories they collaboratively created on the topic of ET use in L2 education. To triangulate the data, I also collected survey responses and conducted semi-structured interviews. In order to delve more deeply into the participants' ET-related perceptions and dispositions, I explored the data with Constant Comparative Methods and deductively explored the digital stories with multimodal theory. Primary discoveries were that the participants believed ET implementation should be purposeful with learning objectives in mind, and educators should acquire knowledge about ET to meet the needs of L2 learners of the 21st century. One

implication is that pre-service teachers and future teacher educators benefit from critically exploring their beliefs regarding the implementation and employment of ET in L2 education. Another implication is that the collaborative creation of multimodal texts, such as digital stories, offers opportunities for pre-service teachers and future teacher educators to explore their beliefs regarding ET use.

CHAPTER 1: INTRODUCTION

Overview

Educational technology (ET) plays a major role in second/foreign (L2) language teaching and learning (Otto, 2017). Research in these fields indicates teacher beliefs influence the ways in which teachers employ educational technology (e.g., Deng, Chai, Tsai, & Lee, 2014; Hismanoglu, 2012; Joo, Park, & Lim, 2018). To develop a better understanding of influences on teachers' ET-related subjective positions, a need exists to explore the ET-related beliefs of current and future teacher educators who are, or will be, responsible for the design and implementation of curricula and learning activities in teacher education programs. In teacher education programs, future teachers are likely to learn about and experience employing various types of educational technology. However, a review of the extant literature indicates little to no research appears to exist on the beliefs of doctoral students, who may themselves become teacher educators in the field of second language acquisition (SLA), regarding the use of educational technology in L2 education. To add to the literature base, I conducted a dissertation focusing on doctoral students who were enrolled in a summer-term course entitled, *Applications of Technology to SLA and FL Education*.

Specifically, I explored the discussion thread posts they wrote and the digital stories they collaboratively created on the topic of educational technology use in L2 education. Other data I collected were their answers to a digital survey, to which 14 of the participants responded, and semi-structured interviews with seven randomly selected participants. In order to delve more

deeply into their ET-related perceptions and beliefs, I analyzed the data inductively (Patton, 2002, 2015) by employing Constant Comparative Methods (Corbin & Strauss, 2008). I additionally employed theoretical concepts from Unsworth's (2006) work on image-text relations to explore the meanings the participants expressed in their digital stories with multiple semiotic systems, including spoken and written language, and static and moving images. The purpose of this dissertation is to contribute to knowledge about potential future teacher educators' beliefs regarding educational technology use in the field of L2 education in the hope that it may make some contribution to the improvement of the overall quality of teacher education and pedagogy in this field.

Genesis of the Dissertation Project

My interest in digital storytelling, a major focus and primary data source of this dissertation, germinated from research projects in which I had participated. After my involvement with these projects ended, I spent many unsuccessful months searching for an opportunity to conduct research involving digital storytelling. Aware of my dilemma, my dissertation committee chair, Dr. John I. Lontas, approached me with an idea. He suggested focusing my dissertation on a digital storytelling project doctoral students were in the process of creating as an assignment for a course in which he was the instructor. The topics of both the course and the digital stories were related to uses of educational technology in L2 teaching and learning. I considered myself fortunate because this suggestion was like a gift-wrapped dissertation project on a topic I had found interesting and with participants and data I could access easily.

Outline of Chapter 1

In this first chapter I lay the groundwork for the study and connect it to the fields of second language acquisition (SLA) and educational technology. Having already provided an overview,

along with a description of the genesis of this dissertation, in this section I offer an outline of the remainder of Chapter 1. Beginning with the background of the dissertation, I discuss the important roles various types of educational technologies have played in L2 education. Then, in a statement of the problem, I assert the need to improve L2 teacher education in order to prepare instructors to effectively employ educational technology with L2 learners who face the challenges of learning new languages and/or learning new academic content through those languages. Then, in a statement of the purpose of this dissertation, I describe my goals and objectives, which were to conduct a study with doctoral students who, in the future, are likely to instruct pre-service L2 teachers and conduct research related to educational technology and second language acquisition. In particular, I delineate how and why I explored their perceptions and dispositions regarding educational technology. Following this section, I discuss what I consider to be two significant aspects of this dissertation: (1) the development of knowledge regarding the ET-related beliefs of doctoral students whose future teaching and research may impact educational technology use in L2 education in the coming years and (2) data analysis methods involving a combination of theoretical concepts and types of data that may allow deeper access to the participants' subjective positions regarding educational technology. Then I list the *a priori* research questions that will guide the inquiry. After defining the key terms and discussing some core concepts I employed in this dissertation, I describe the epistemological beliefs and theoretical perspectives that shaped my approach to this dissertation and my subjective understandings of the data. Finally, I close this chapter with summaries of both the topics I covered herein and the contents of the remaining chapters of this dissertation.

Background of the Dissertation

Technology plays a major role in L2 language education in various contexts around the world (Chapelle & Sauro, 2017; Otto, 2017). Students who learn in online or hybrid classes, at the very least, employ learning management systems (LMS) (e.g., Canvas, Blackboard) and/or some other form of information and communication technology (ICT) (e.g., email). Students in technologically advanced countries who study in brick-and-mortar schools or other types of contexts are also likely to employ some types of educational technology, such as computers, portable devices, and/or various kinds of software applications. According to Chapelle and Sauro (2017),

For the many diverse learners, the use of computer technology for all facets of second language learning has dramatically increased as the reach of the internet continues to spread, providing access to social media, reference materials, online instruction, and more. The implications for language teachers, learners, materials developers, and researchers are extensive. (p. 1)

A literature review by Golonka, Bowles, Frank, Richardson, and Freynik (2014) illustrates the breadth of educational technology use in L2 education. Reviewing more than 350 studies, the authors identified four categories of educational technology use in foreign language education: “classroom-based technologies, individual study tools, network-based social computing, and mobile and portable devices” (p. 71). These categories included eighteen sub-categories of technologies, such as course management systems, intelligent tutoring systems, social networking, and smart phones and cellphones. As Chapelle and Sauro (2017) and Golonka et al. (2014) pointed out, the extensive use of various educational technologies is a major characteristic of the current state of L2 education in many countries throughout the world.

Teachers and students employ the extant cornucopia of educational technology for a wide variety of purposes in L2 education. These include improving L2 learners' comprehension of the target language and helping them expand their meaning-making potential. For example, to learn grammar, teachers and students have employed different types of Computer-Assisted Language Learning (CALL) technology, including intelligent CALL (ICALL), corpora-based CALL, and computer-mediated communication (CMC) (Heift & Vyatkina, 2017). Vocabulary acquisition has been a target of technologies such as mobile-assisted vocabulary learning (MAVL) and computer-assisted vocabulary learning technologies (CAVL), which include e-dictionaries, open-online resources, and lexical concordancers (Ma, 2017). A metaanalysis by Chiu (2013) indicates CALL can have a positive impact on L2 vocabulary acquisition.

To improve listening comprehension and knowledge of the target language, L2 learners have employed a variety of technologies, such as those that enhance audio input (e.g., strategic use of subtitles) or provide context for it (e.g., graphic organizers) (Hubbard, 2017). Technologies with synchronous audio or video communication functions, such as telecommunication application software (e.g., Skype) and virtual world platforms (e.g., Second Life), enable interaction in the target language that promotes the development of L2 listening competence (Levak & Son, 2017). Students targeting pronunciation or oral communication competence can record and listen to their voices with audio editing technology (e.g., Audacity) or tools available in social media platforms, such as VoiceThread, that allow users to post their voices in lieu of written comments (Blake, 2017). Other technologies that can help improve speech include CALL tutorials that provide feedback on spoken output (e.g., Rosetta Stone), and speech-to-text dictation software (e.g., Dragon) that can challenge L2 students to continue working on their pronunciation until the app recognizes it (Blake, 2017). Voice Over Internet

Protocol (VoIP) technology, such as Skype, also allows students to engage in synchronous oral and visual communication with people around the world (Giglio, 2019).

In addition to oral communication, research indicates educational technology can promote target-language reading comprehension (Liaw & English, 2017). One way is through the inclusion of hypertext in digital reading material that can provides readers with various types of multimodal annotations (Liontas, 2001b). Multimodal annotations appeal to learners with different learning styles or preferences (Liontas, 2001b) and can aid comprehension by enabling readers to encode information in both verbal and non-verbal storage systems (Chun & Plass, 1997; Liontas, 2001b). This is especially the case when readers have the option of which types of multimedia or multimodal annotations they wish to employ (Liontas, 2001b).

According to a literature review and meta-analysis by Mannion, Siegel, Li, Pham, and Alshaihi (2019), researchers have explored the use of various technologies to improve competence with L2 writing, including blogs (e.g., Armstrong & Retterer, 2008; Arslan & Şahin-Kızıl, 2010; Bloch, 2007; Dippold, 2009; Ducate & Lomicka, 2008; Featro & DiGregorio, 2016; Pham & Usaha, 2015), language corpora (Hsieh & Liou, 2009), email (e.g., Mahfouz, 2010), interactive white boards (e.g., Amiri & Sharifi, 2014), personal web pages (e.g., Shin & Cimasko, 2008), machine translation (Garcia & Pena, 2011), mobile devices (Hwang, Chen, Shadiev, Huang, & Chen, 2014), and wikis (e.g., Aydin & Yildiz, 2014; Chao & Lo, 2009; Lee, 2010; Li & Zhu, 2013). Researchers in multiple studies have found evidence of improvement in aspects of L2 writing such as audience awareness (e.g., Castañeda, 2013b; Gebhard, Shin, & Seger, 2011), use of rhetoric (e.g., Bloch, 2007; Xing, Wang, & Spencer, 2008), and creative expression (e.g., Ducate & Lomicka, 2008). Many participants in these studies reported various positive learner outcomes, including heightened motivation (e.g., Noytim, 2010), confidence

(e.g., Houat, 2012), and creativity (e.g., Chen & Brown, 2012). Furthermore, a meta-analysis of 21 studies focusing on English language learners by Xu, Banerjee, Ramirez, Zhu, and Wijekumar (2019) also pointed to the positive impact technology may have on writing accuracy.

Potential positive impacts on learners' affective factors, such as attitude and self-efficacy (Bandura, 1977), have served as rationales for employing gaming in L2 education (e.g., Yükseltürk, Altıok, & Başer, 2018). In addition, gaming can promote L2 acquisition through “purposeful communication” (Liontas, in press-a, p. 3) in the target language. Gaming, according to Reinhardt (2017), facilitates the collaborative construction of knowledge and the negotiation and articulation of meaning, provides sheltered environments in which the game or players have control over linguistic input, and promotes informal learning. Peterson (2009), who conducted a meta-analysis of studies on gaming and simulation in L2 education, concluded that the body of research “provides compelling evidence that participation in gaming and simulation may facilitate aspects of SLA and the development of communicative competence” (p. 89).

Studies on digital storytelling, an arts-based and technology-infused approach to literacy and a primary data source for this dissertation, supply rationales for employing various educational technologies in L2 learning contexts (Batsila & Tsihouridis, 2016; Castañeda, 2013a; Kim, 2014). Collectively, these studies provide further examples of their impact, and perceived impact, on L2 learner outcomes. Digital storytelling projects have involved L2 learners in employing different types of technology, including storyboards (e.g., Batsila & Tsihouridis, 2016), audio (e.g., Alcantud-Díaz, Ricart Vayá, & Gregori-Signes, 2014), and video editing tools (e.g., Bozdogan, 2012; Thang, Mahmud, & Tng, 2015). These technologies, and others, have mediated the improvement of L2 learners' competence, or self-perceived competence, with digital literacy (e.g., Noguerón-Liu & Hogan, 2017), multimodal literacy (e.g., Lee, 2014),

speaking skills (e.g., Afrilyasanti & Basthomi, 2011; Kim, 2014), and writing ability (e.g., Sevilla-Pavón, Serra-Cámara, & Gimeno-Sanz, 2012; Soler-Pardo, 2014). The findings of other studies have provided evidence that digital storytelling projects can positively impact motivation (Xie, 2016), confidence (Lee, 2014), and creativity (Hwang et al., 2016).

While in many of the aforementioned studies, teachers, and perhaps even students, may have had the option of employing or not employing specific types of educational technologies, in other contexts, such as online and hybrid courses, the use of some form of technology is a necessity. At the very least, teachers and students in these types of courses need to employ an LMS or some form of information and communication technology. The number of teachers and students using online and hybrid course-related technology has increased as these types of courses have grown in popularity due to their potential to reduce costs and enroll students who cannot or prefer not to attend face-to-face classes (Otto, 2017). As a result of changes in class dynamics such as these and developments in the types and uses of ET, “technology has advanced from its ancillary role in the curriculum to become a core source of content and a conduit for authentic language learning experiences” (Otto, 2017, p. 21). In many L2 education contexts, teachers and students alike either need or desire to employ educational technology.

In addition to formal learning contexts, L2 students with access to the requisite resources have the option of developing L2 competence informally (Davies, 2016) through the employment of technological tools that enable them to learn the target language (e.g., language learning apps), learn through the target language (e.g., apps for learning subjects such as history in the target language), or communicate, play, or both, in the target language (e.g., using Facebook or online multiplayer games in the target language). L2 learners with computers, smartphones, or tablets can choose from a wide variety of apps that enable these types of

learning experiences. As a personal example, while I am, according to Prensky (2001), a *digital immigrant* and consider myself less tech savvy than many *digital natives*, I have probably had more than ten different apps on my iPhone and iPad for learning the Japanese language (e.g., KanjiBox) or communicating in it (e.g., Line).

As the aforementioned studies and examples indicate, practitioners and students can employ a wide range of educational technologies for a variety of purposes in L2 learning contexts. Even those who may be skeptical of educational technology's potential to improve the effectiveness or efficiency of L2 acquisition (e.g., Clark, 1994) would probably recognize that educational technology has now become an integral part of language education for a great many teachers and students. In the following section, I discuss the implications educational technology use has in many L2 teaching and learning contexts.

Statement of the Problem

Information and communication technology (ICT) plays important roles in the lives and education of many L2 students (Chapelle & Sauro, 2017; Otto, 2017). For foreign language learners, the mediation (Vygotsky, 1978) of educational technology can help them achieve proficiency in the target language with the potential to open up academic, professional, and/or social interaction opportunities (American Council of the Teaching of Foreign Languages, n.d.). However, for many second language learners who live immersed in the target language, a critical need can exist to develop L2 competence (OECD, 2015, 2018). For them, academic and professional success, as well as social interaction and well-being, can hinge on developing proficiency with the target language (OECD, 2018). According to the Organization for Economic Cooperation and Development (OECD) (2018), “[s]ocio-economic disadvantage and language barriers are two of the greatest obstacles to the successful integration of students with an

immigrant background” (p. 14). Results of a comprehensive academic achievement test the OECD conducted around the world in 2012, the Programme for International Student Assessment (PISA), indicated immigrant children who were not proficient in the language of assessment tended to score lower than their native-speaking peers (OECD, 2015).

Developing proficiency in the target language can be challenging for second language learners because not only do they need to learn a new language, they also have to simultaneously learn academic content through it as well. According to Cummins (1999, 2013), while it can take around two years for immigrants to develop Basic Interpersonal Communication Skills (BICS) on par with their native-speaker peers, parity with Cognitive Academic Language Proficiency (CALP) can take as many as five to ten years. Effectively employing the affordances (van Lier, 2000) of educational technology (e.g., ICT), then, can help mediate students’ learning of the target language and content knowledge, as well as develop digital literacy (Hockly, 2012; Pegrum, 2010; Rivoltella, 2008) competence that could benefit them throughout their academic and professional lives.

With the positive contributions educational technology can make to L2 education, a need exists to maximize the effectiveness and efficiency of its use in formal learning contexts. Research indicates that potential influences upon classroom uses of educational technology across the curriculum include teachers’ TPACK, or “technology, pedagogy, and content knowledge” (Koehler & Mishra, 2009, p. 60), ET-related self-efficacy (Joo et al., 2018; Wang, Ertmer, & Newby, 2004), and dispositions (e.g., an openness to change) (Baylor & Ritchie, 2002; Vannatta & Fordham, 2004). More specifically, Baylor and Ritchie (2002) stressed the importance of these teacher-related influences upon educational technology employment: “[r]egardless of the amount of technology or its sophistication, technology will not be used

unless faculty members have the skills, knowledge, and attitudes necessary to infuse it into the curriculum” (p. 398). Similarly, Tondeur, van Braak, Ertmer, and Ottenbreit-Leftwich (2017) have pointed to the importance of attitudes, stating, “[r]esearchers have argued that teachers’ classroom practices are highly influenced by their pedagogical beliefs (Fives and Gill 2015; Kagan 1992; Pajares 1992; Richardson 1996)” (p. 556).

Both the *NMC Horizon Report: 2017 Higher Education Edition* (Adams Becker et al., 2017) and *NMC/CoSN Horizon Report: 2016 K-12 Edition* (Adams Becker, Freeman, Giesinger Hall, Cummins, & Yuhnke, 2016), which reported “the trends, challenges, and technology developments likely to have an impact on teaching, learning, and creative inquiry” (EDUCAUSE, 2018), stressed the needs for providing ET-related education for teachers and re-thinking educators’ roles as educational technology becomes increasingly indispensable in K–12 and tertiary education. The authors (Adams Becker et al., 2017) of the former report on university education noted that “[e]ducators are increasingly expected to employ a variety of technology-based tools, such as digital learning resources and courseware, and engage in online discussions and collaborative authoring” (emphasis in original) (p. 34). The authors of the latter report on K–12 education (Adams Becker et al., 2016) asserted that redefining the roles of educators is a necessary but “Solvable Challenge” (p. 24) resulting from ET-related shifts in students’ learning needs. According to Adams Becker et al. (2016), teachers should serve more as mentors or guides and enable students to take more control of their learning.

Professional discipline standards also call on teachers and teacher educators to improve their knowledge of ET. The International Society for Technology in Education (ISTE) (2020), for example, has developed “Educator Standards” which call on “[e]ducators [to] facilitate learning with technology to support student achievement of the ISTE Standards for Students”

(<https://www.iste.org/standards/for-educators>). *The 6 Principles for Exemplary Teaching of English Learners* (TESOL International Association, 2019) and *The TESOL Standards for Initial TESOL Pre-K–12 Teacher Preparation Programs* (TESOL International Association, 2019), and the TESOL Technology Standards Framework (Healey et al., 2008) call on teachers to implement and employ ET improve ESL students' learning opportunities and to improve their learning outcomes.

One way to prepare pre- and in-service teachers to assume new roles and improve the quality of ET use in L2 education is to ensure they acquire the education, training, experience, and professional development they need to employ educational technology effectively. Many pre- and in-service teachers who are *digital natives* (Prensky, 2001) would also require this type of education because growing up using technology for personal reasons does not guarantee being able to employ it effectively for pedagogical purposes (Lei, 2009). To ensure that pre- and in-service teachers acquire the necessary pedagogical skills and knowledge, a need exists to develop an understanding of the nature and quality of extant teacher education, likely future directions of teacher education, and influences upon both of these. In teacher training programs, as well as teaching practica, pre-service teachers may encounter and/or use a variety of technological tools. For example, in my M.Ed. and doctoral-level courses I have employed word processing software (e.g., Microsoft Word), synchronous and asynchronous computer-mediated communication (e.g., Skype, text messages, email), learning management systems (e.g., Blackboard, Canvas), digital multimodal ensembles (e.g., PowerPoint slides, instructional videos) (Serafini, 2014), and other types of educational technologies for learning or teaching (e.g., vocabulary learning apps, language learning games).

Experiences pre-service teachers have during their teacher education programs can impact the ways in which they view and employ educational technology in their future classrooms (Heo, 2009, 2011). For example, if they perceive they have successfully employed educational technology in their studies or practica, they are more likely to develop positive beliefs regarding their ET-related self-efficacy (Al-Awidi & Alghazo, 2012; Bandura, 1992; Jia, Jung, & Ottenbreit-Leftwich, 2018). The knowledge they acquire during their education or training also has the potential to influence their decisions regarding what types of educational technologies to employ and how to use them. Teachers with positive dispositions and self-efficacy regarding educational technology are more likely to integrate educational technology into their teaching (Vannatta & Fordham, 2004).

One potential area of research that could help deepen the understanding of ET-related education, including its underlying rationales and goals, involves the beliefs of university faculty, as well as future university faculty, in the field of L2 education. These professionals may apply their beliefs in the design and implementation of curricula, learning experiences, and teaching practica in which pre-service teachers learn about and experience educational technology. For example, university faculty who value the purposeful use of educational technology in L2 education may try, for example, to engage education majors in learning experiences that promote effective use of said technology. An improved understanding of current and future teacher educators' relevant beliefs may thus have the potential to contribute to knowledge regarding how to improve the quality of ET-related education for pre-service teachers.

While teacher educators' perceptions of educational technology may evolve continuously over the course of their careers, research indicates that educators' beliefs may be particularly

malleable during the earlier stages of their teacher education (Heo, 2011; Hoy & Spero, 2005). There is value in researching the beliefs of doctoral students because their current ET-related beliefs are likely to influence at least the initial directions (e.g., research, instruction, curriculum design) they take during their careers. For example, as doctoral students and candidates, their subjective perceptions of educational technology may influence their approaches to ET while they write their dissertations. Those interested in educational technology may write dissertations with the potential to contribute to the improvement of ET-related teacher education and/or the employment of educational technology in L2 learning contexts. The interest and knowledge they develop while writing their dissertations or conducting other research may also lead them, and others, to make greater contributions in these fields. A need thus exists to explore the ET-related perceptions and dispositions of doctoral students who are in the field of second language acquisition. This knowledge could help develop a clearer picture of where the field stands in relation to educational technology, as well as its potential future directions. Borg (2006), who has published extensively on language teacher cognition (e.g., Borg, 1999, 2003, 2011, 2012, 2018), provides the following rationale for conducting research on the beliefs of L2 teachers and L2 teacher educators:

A key factor driving the increase in research in teacher cognition, not just in language education, but in education more generally, has been the recognition of the fact that teachers are active, thinking decision-makers who play a central role in shaping classroom events. Coupled with insights from the field of psychology which have shown how knowledge and beliefs exert a strong influence on human action, this recognition has suggested that understanding teacher cognition is central to the process of understanding teaching. (p. 1)

Rationale

It is important to understand the ET-related beliefs of doctoral students in the field of SLA because in the future they are likely to instruct L2 education majors. The beliefs and perceptions of these doctoral students have the potential to influence the design of curriculum, learning experiences, and service learning in which future L2 educators engage. In addition, they are likely to conduct and publish research with the potential to influence other researchers and educators in the field of L2 education. Through instruction and research, their perceptions and beliefs may further influence future trends in educational technology usage in K–12 and tertiary L2 contexts.

Therefore, in this dissertation, I explored the ET-related beliefs of doctoral students in an educational technology and second language acquisition program who had enrolled in a summer hybrid course on the subject of ET use in L2 education. In particular, I searched for themes representing their ET-related beliefs in online asynchronous discussions and collaborative digital stories, both of which were course assignments. Furthermore, I conducted semi-structured interviews and a digital survey to triangulate the data and obtain deeper insight (Tracy, 2012).

I hope that knowledge obtained from this dissertation may contribute in some way to the improvement of L2 education. One possible contribution is that relevant professionals in the fields of educational technology and/or L2 education, such as teacher educators, administrators, or researchers, might apply this knowledge toward the design and implementation of curricula and learning experiences that will help prepare pre-service teachers to effectively employ educational technology with their future L2 students. Another possible contribution is this dissertation may help direct attention to the training and apprenticeship of future teacher educators (i.e., doctoral students) in the field of L2 education. A better understanding of what

future teacher educators believe may help inform decisions regarding the improvement of teacher education.

Significance of Dissertation

In general terms, a significant aspect of this dissertation is its potential to contribute to the body of knowledge on the beliefs of doctoral students in the field of second language acquisition regarding the use of educational technology in L2 education. To my knowledge, little to no research exists which combines this subject with this type of study participants. Conducting research with participants such as these is important because, in the future, at least some of them are likely to become teacher educators who will instruct, as well as design and implement curriculum for, education majors who will, in turn, teach L2 students after they graduate. The doctoral students' perceptions of and beliefs about educational technology have the potential to influence those of the pre-service teachers through their instruction and the learning activities they design and implement. In addition, the quality and quantity of ET-related education and training the doctoral students develop and implement in the future has the potential to impact pre-service teachers' *Technological Pedagogical Content Knowledge* (TPACK), which is a critical element of teacher knowledge in the 21st century (Koehler & Mishra, 2009).

What and how pre-service teachers learn in their education and training may influence how they employ educational technology with their future L2 learners (Heo, 2009, 2011). Pre-service teachers with positive perceptions and self-efficacy regarding educational technology are more likely to develop and implement learning experiences involving educational technology for their L2 students (Joo et al., 2018; Vannatta & Fordham, 2004). The research that this dissertation's participants conduct in the future could similarly impact the perspectives of other teacher educators or researchers in the fields of L2 language education, educational technology

education, or both. Accordingly, I believe research on the ET-related perceptions and beliefs of doctoral students in the field of second language acquisition is significant because of its potential to contribute to knowledge that may help improve the quality of educational technology employment in L2 education.

Other potentially significant aspects of this dissertation relate to the dynamics of the types of participants, the combination of the data types, and the means for exploring the data. While I discussed the importance of conducting research with doctoral students in the field of second language acquisition in the paragraphs above, I would also hasten note that, to my knowledge, little to no research exists involving doctoral students in the fields of teacher education or L2 education who participated in digital storytelling projects. I have been able to locate studies involving education courses at the undergraduate (e.g., Heo, 2009, 2011; Røkenes, 2016) and master's level (e.g., Kortegast & Davis, 2017; van Galen, 2017) that involved digital storytelling, but I could locate only one study (Liontas, in press-b) involving doctoral students' participation in digital storytelling projects and online discussion threads in the field of second/foreign language education.

Moreover, I could not locate any studies in which the authors employed the same combination of data I collected, online asynchronous discussion threads, digital stories, semi-structured interviews, and digital surveys, at any level of education. One significant aspect of this combination of data are the types of modalities they involve: written language in the discussion threads and survey responses, oral language in the semi-structured interviews and digital story narration, and combinations of modalities in the digital stories (e.g., oral language, written language, static images, moving images, music). These dynamic combinations of intersemiotic resources (Royce, 1998, 2007) may afford (van Lier, 2000) more insight into the participants'

perceptions and beliefs than analysis of written and oral language alone could provide (Richards, 2006). I believe these multiple modalities, which the arts-based nature of digital storytelling afforded (Leavy, 2015), enabled the participants to express meanings on deeper levels than the monomodal data (i.e., discussion threads, surveys, interviews) alone would have permitted (Richards, 2006).

Another potentially significant aspect of this dissertation relates to its methodology. In addition to inductive data analysis with Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013; Saldaña, 2009; Strauss & Corbin, 1998), I explored data from the participants' digital stories with multimodal theory (Kress & van Leeuwen, 2006; Serafini, 2014), particularly Unsworth's (2006) work on image-text relations, which is based in part on theories from Systemic Functional Linguistics (SFL) (Halliday & Matthiessen, 2004). I believe this approach was significant because it helped develop a deeper and richer understanding of the meanings the participants expressed in their digital stories. SFL, and the multimodal theories (e.g., Kress & van Leeuwen, 2006; Unsworth, 2006) it informs, is an approach to communication that that helps link semiosis (i.e., signs that modalities such as language or images enact) with the construal and construction of meaning (Eggins, 2004), thereby providing even deeper insight into the data of this dissertation.

In sum, I believe this dissertation has the potential to contribute to a body of knowledge with the potential to improve the quality of L2 education by constructing knowledge related to developing professionals who are likely to design and implement L2 teacher education in the future. These professionals are also likely to conduct research in fields that may influence other researchers or teacher educators. In addition, the combination of participants, data collection, and

data exploration methods purposefully applied in this dissertation have the potential to serve as a viable model for approaches and methodology in these fields of research.

***A Priori* Research Questions**

The following *a priori* questions guided my inquiry:

1. What are the educational technology-related themes embedded in the doctoral students' discussion threads?
2. What are the educational technology-related themes embedded in the doctoral students' digital stories?
3. In what ways do the doctoral students experience a digital storytelling project?
4. How do the doctoral students perceive the use of educational technology in second/foreign language education?

The purpose of Research Questions 1 and 2 is to explore the participants' beliefs regarding educational technology through the employment of two different data sets. However, Research Question 1 differed from Research Question 2 in that its data source, online asynchronous discussion threads, were interactive in nature and involved discussion and the negotiation of meaning. Conversely, while the data for Research Question 2 (digital stories) were more unidirectional and did not involve interaction or negotiation, the digital stories were generally more multimodal in nature. Some of the discussion thread posts for Research Question 1 included images; however, the digital stories were replete with static images, moving images, written language, spoken language, and background music. The purpose of Research Question 4 was also to explore the participants' ET-related beliefs, but this research question involved all four of the primary data sets (discussion threads, digital stories, digital survey, semi-structured interviews). In contrast to the other three research questions, which focused on the participants'

ET-related beliefs, the purpose of Research Question 3 was to consider the potential value of digital stories as a means for doctoral students to explore and express their own beliefs. In this sense, this dissertation also serves as an exploratory study (Hancock & Algozzine, 2011).

Definitions of Terms and Concepts

In this section I define some of the key terms and concepts I employed in this dissertation.

Beliefs. For an operational definition of *beliefs*, I turned to Michaela Borg's (2001, p. 186) succinct definition:

a belief is a proposition which may be consciously or unconsciously held, is evaluative in that it is accepted as true by the individual, and is therefore imbued with emotive commitment; further, it serves as a guide to thought and behaviour.

However, in order to distinguish distinguished *beliefs* from *knowledge*, the following definitions by Bruzzano (2018), who reviewed literature on teacher cognition, are also helpful. Bruzzano (2018) described

knowledge as possessing features of objectivity and impersonality (e.g. propositional knowledge of language and syllabi) and teacher beliefs as propositions that the individual personally regards as true. In this sense, beliefs have an evaluative, affective and episodic nature which sets them apart from propositional knowledge ... (p. 60)

Digital storytelling. The capitalized term "Digital Storytelling" originated from community activism and community art work Lambert, Mullen, and Atchley did in the San Francisco area in the 1990s (Lambert, 2009, 2013). Lambert (2009, 2013) recommends seven components of Digital Stories that indicate they should be brief (2–3 minute) videos focusing on the author's own experiences. Their creators also narrate them with their own voices in the first person. Lambert (2013) further suggests using still images, instead of moving images, "to create

a relaxed visual pace against the narration” (p. 38) and employing music “to add meaning and impact to the story” (p. 38). He also stresses that the processes of Digital Storytelling are more important than the product, and that this digital art form “privileges self-expression and self-awareness” (p. 38).

Some articles (e.g., Xie, 2016), books (e.g., Miller, 2004), and websites (e.g., <http://digitalstorytelling.coe.uh.edu/>) offer other definitions or descriptions of digital storytelling (or “Digital Storytelling”) that are based, at least in part, on the work of Lambert (2009, 2013) and his colleagues. Bran (2010), for example, offers a succinct yet broad definition: a “digital story is a short (usually between 3 to 5 minutes) clip, which consists of a series of still images, combined with oral and/or written text. Additional music is sometimes used to invoke emotion or induce other effects” (pp. 1791–1792). Røkenes (2016), who employed digital storytelling in a teacher education program, uses a definition similar to Bran’s (2010) in its brevity, but it just includes their multimodal components (narration and static images) and the video editing tools their creators can employ (e.g., Movie Maker). Another definition similar to Bran’s (2010) comes from Condy, Chigona, Gachago, and Ivala (2012), who suggested the following: “A digital story is a multimedia text incorporating still images complemented by a narrated soundtrack to tell a story or present a documentary” (p. 279). However, some definitions have expanded the meaning beyond what Lambert and his colleagues originally intended (e.g., Abdel-Hack & Helwa, 2014). The following quote by Robin (2008), for example, broadens the range of what we might consider digital stories by organizing types of them into three categories:

- (a) personal narratives - stories that contain accounts of significant incidents in one’s life;
- (b) historical documentaries – stories that examine dramatic occurrences that help us

understand the past; and (c) stories designed to inform or instruct the viewer on a particular concept or practice. (p. 430)

Robin (2008) additionally identifies the following ways teachers can employ digital storytelling in education: “from personal tales to the recounting of historical events, from exploring life in one’s own community to the search for life in other corners of the universe, and literally, everything in between” (p. 429).

For the purposes of this dissertation, I employ the following synthesis of the abovementioned definitions and descriptions of digital storytelling in education contexts: A digital story is a brief (roughly 2–10 minute) video (Robin, 2006, 2008, 2016) composed of still and/or moving images and, optionally, background music (Bran, 2010; Lambert, 2013).

Educational purposes of digital stories include instructing viewers, telling stories, or sharing viewpoints or personally relevant experiences (Condy et al., 2012; Robin, 2006, 2008, 2016).

“Digital storytelling with a twist (DS+)”. The type of digital story the participants collaboratively created in this dissertation were, as the course instructor described them, “digital storytelling with a twist” (Liontas, in press-b, p. 70). Put more succinctly, they were *DS+*. Representing 40% of the course’s final grade, the *DS+* were to be “a research-based digital story exhorting the many benefits of multimedia technology, digital tools, or media-based platforms deemed most beneficial to the learning and teaching of foreign/second languages” (Liontas, in press-b, p. 70). The instructor suggested the participants employ persuasion based on *ethos* (i.e., the credibility of the source of their arguments) and *logos* (i.e., logic) instead of *pathos* (i.e., emotion) (Liontas, 2020; in press-b; personal communication, July 15, 2020). The instructor also encouraged them to employ “*syllogism* (a deductive three-part logic containing two premises and one valid conclusion)” (Liontas, in press-b, p. 70) or *enthymeme*, which is similar to *syllogism* except that one

of the premises is implied instead of expressly stated (Liontas, 2020; Liontas, in press-b; Liontas, personal communication, July 15, 2020).

Disposition. In this dissertation, I employ a definition of *professional dispositions* (hereafter “disposition”) from Hoadley and Ensor (2009), who state they are ways in which teachers think and speak about their subject knowledge, students, pedagogic practice and the relationship between themselves and their students... The use of ‘dispositions’ in ‘professional dispositions’ is loosely based on Bourdieu (1974), referring to relatively stable ways of looking at the world that guide action. (pp. 877–878).

Educational technology. Various authors have offered different definitions of *educational technology* (ET). According to Spector (2008), *educational technology* is “[t]he disciplined application of scientific principles and theoretical knowledge to support and enhance human learning and performance” (p. 21). The following definition by the Definition and Terminology Committee of the Association of Educational Communications and Technology (2008), which includes the term *resources*, suggests there may be a material dimension to *educational technology*: “Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources” (p. 1). Kim, Lee, Merrill, Spector, and van Merriënboer (2008) differentiate between *educational technology* and *instructional technology* thus:

Roughly speaking, educational technology is broad in scope and includes technologies that support any kind of learning in any environment. The term instructional technology is more narrowly focused on the use of technology to support specific, intended, and planned learning outcomes. (p. 812)

In this dissertation, I combined these three descriptions and definitions of *educational technology* to come up with the following operational definition: The term *educational technology* involves

the physical (e.g., hardware, material objects) and/or digital (e.g., software, Internet technology) materials educators and students employ for the purposes of teaching or learning, as well as the reasoned and theoretically-grounded understandings and applications of those materials.

Experience. The online Merriam-Webster Dictionary (2018) offers the following definitions of *experience*: “a: direct observation of or participation in events as a basis of knowledge” and “b: the fact or state of having been affected by or gained knowledge through direct observation or participation” (<https://www.merriam-webster.com/dictionary/experience>). Beard and Wilson (2013) describe a model for designing experiential learning activities in which educators take into consideration learners’ internal environments, external environments, and perceptions. The two environments are composed of six philosophical considerations: *being* and *thinking* (thinking environment), *doing* and *belonging* (external environment), and *feeling* and *sensing* (sensors). Beard and Wilson employ the metaphor of a combination lock in which each of these six philosophical considerations represents a tumbler that instruction designers must align in order to develop activities (i.e., experiences) that result in learning. In their model, Beard and Wilson additionally stress the importance of emotions and the need for reflection in order for learning to occur. In this dissertation, the term *experience* refers to both (1) perceiving, participating in, or thinking about activities or happenings [e.g., material or mental activities (Eggins, 2004; Halliday & Matthiessen, 2014)] and (2) gaining knowledge from those activities or happenings. In addition, borrowing from Beard and Wilson (2013), I consider emotions and reflection to be important aspects of experience.

Foreign language. In this dissertation, I use the term *foreign language* to refer to languages people learn without a strong need to employ them in their lives outside of their

classrooms, such as at their homes, local communities, or professions. For example, students who live in China and primarily speak Chinese in their daily lives, would likely learn English at their schools as a *foreign language* (VanPatten & Benati, 2015). For some foreign language students, the only place they employ or practice the target language may be in education contexts such as their classrooms.

Games and educational games. For the purposes of this dissertation, I turn to Reinhardt's (2019) definitions of *games* and *educational games*. Paraphrasing the Merriam-Webster dictionary (which he did not cite), Reinhardt (2019) described *games* as activities that are "playful and engaging, goal-oriented, and rule-governed" (p. 78). An *educational game*, however, is "purposefully designed to be a tool or resource for learning, and is usually sold as such" (p. 4).

L2. In this dissertation, the abbreviation *L2* can mean *both* second and foreign languages, or it can refer to *either* second *or* foreign languages.

Mode. Serafini (2014) offers the following definition: a "mode is a system of visual and verbal entities created within or across various cultures to represent and express meanings. Photography, sculpture, painting, mathematics, music, and written language are examples of different modes" (p. 12). Serafini distinguishes *mode* from *media* by defining the latter as the means of transmission.

Multimodal ensembles. Multimodal ensembles are texts, or cohesive units of communication (Halliday & Hasan, 1976), that employ more than one modality or semiotic resource, such as a combination of images and language, to communicate information within cultural contexts (Serafini, 2014).

Multimodality. Multimodality refers to types of communication, and the study of theories related to such communication, that involve more than one mode (Jewitt, Bezemer, & O'Halloran, 2016; Matthiessen, 2007; Serafini, 2014; Unsworth, 2006).

Second language. I employ the term *second language* to refer to languages students learn to communicate with people in the communities where they live (VanPatten & Benati, 2015). For example, children who have immigrated to a new country learn the local language as a *second language* and use it in their schools, communities, or professions.

Self-efficacy. In this dissertation I employ definitions of *self-efficacy* and *teacher self-efficacy* from Joo, Park, and Lim (2018):

Self-efficacy can be defined as an individual's belief in one's ability to organize and implement actions to carry out designated types of performance and tasks (Bandura, 1977). Teacher self-efficacy refers to 'the teacher's personal belief in ability to plan instruction and accomplish instructional objectives (Gavora, 2010, p. 18)'. (p. 49)

According to Bandura (1992), self-efficacy has a major impact on people's behavior, cognition, emotions, and motivation. In this dissertation, I employ the term *self-efficacy* to refer to both *self-efficacy* and *teacher self-efficacy*.

Target language. The term *target language* refers to second or foreign languages whose acquisition is the object of study, teaching, or learning in a given context (Larsen-Freeman & Anderson, 2011).

Teacher cognition. Borg (2003) defines *teacher cognition* as "what teachers think, know, and believe" (p. 81).

Themes. I include definitions of *theme* here as their identification is the focus of Research Questions 1 and 2. For the purposes of this dissertation, I employ Saldaña's (2009) and

Guest, Macqueen, and Namey's (2012) definitions of *themes*, which are similar. Saldaña (2009) states that "a theme is a phrase or sentence that identifies what a unit of data is about and/or what it means" (p. 140). Guest, Macqueen, and Namey (2012) offer a similar definition: "Ideas, phrases, and/or concepts that identify or define what a statement is about or the core meaning of a response or expression" (p. 282).

TPACK. TPACK stands for "technology, pedagogy, and content knowledge" (Koehler & Mishra, 2009, p. 60), which are the types of knowledge teachers need in this age of advanced technology (Mishra & Koehler, 2006). TPACK serves as a framework for teacher education that addresses not only each of its individual knowledge components (*T*, *P*, and *C*), but also the intersections of these types of knowledge as well: Technology and Pedagogy (*TP*), Technology and Content (*TC*); Pedagogy and Content (*PC*), and Technology, Pedagogy, and Content (*TPACK*) (Koehler & Mishra, 2009). Some of the studies I discuss employed TPACK as a framework for the design of learning activities and/or learning objectives (e.g., Aşık, 2016; Kildan & Incikabi, 2015).

Epistemological and Theoretical Perspectives

In this section, I discuss my beliefs regarding the nature of knowledge and learning, theoretical concepts informing my beliefs, and how these relate to this dissertation. As a proponent of educational practices consistent with constructivism (Fosnot, 2005) and Sociocultural Theory (Lantolf & Thorne, 2006; Vygotsky, 1978), I believe effective learning experiences are those in which students actively and collaboratively create knowledge rather than passively receive it (Freire, 2014; Richards, 2011; Stabile & Ershler, 2015). I agree with Fosnot (2005), who believes teachers should serve as "facilitators, provocateurs, and questioners" (p. 13) in these types of approaches. I furthermore believe sociocultural contexts profoundly influence the

construction of knowledge and that the mediation of other people and culture are necessary requirements for the acquisition of knowledge (Lantolf & Thorne, 2006; Vygotsky, 1978).

I also take Post-Positivist and Post-Structuralist approaches to research and the nature of knowledge. Unlike proponents of positivism, who search for an objective truth (Denzin & Lincoln, 2005a), I share Post-Positivists' and Post-Structuralists' beliefs that understandings of the truth are subjective and relevant to context (Court, 2018; Richardson & St. Pierre, 2005; Tracy, 2012). I also think that people interpret what they believe the truth to be (Richardson & St. Pierre, 2005). My approach in qualitative research is also *interpretivist* in nature because what I “seek is the subjective truth of the research participants, the meanings they assign to their lives and cultures, perceived and understood through the researcher’s experience, empathy and intelligence” (Court, 2018, p. 4). Another reason I generally prefer qualitative to quantitative research is that because with the former type we recognize and affirm how our subjective evaluations influence our interpretations of data and our representations of findings (Anfara, Brown, & Mangione, 2002; Bezemer & Mavers, 2011). However, I have included a relatively small amount of quantitative data in this dissertation. The majority of the survey questions (Items 1–24) were open-ended, but Items 25–33 are Likert-scale.

Other theories also inform my views of what constitutes knowledge and learning, along with their relationship to language. Among them are Halliday’s (1993) *language-based theory of learning* and Systemic Functional Linguistics (Eggins, 2004; Halliday & Matthiessen, 2014). These theories centralize the role of language in their descriptions of how people negotiate and collaboratively construct knowledge and understandings of experience, through which they also deepen cognitive ability, within social and cultural contexts. These ideas also form the theoretical underpinnings of the multimodal data analysis I propose to employ (Kress & van

Leeuwen, 2006; Unsworth, 2006). In my exploration of the data I took a Hallidayan perspective that language is a means for people to construe, construct, negotiate, and enact meaning on interpersonal and experiential levels within contexts of situation and culture (Eggins, 2004; Halliday & Matthiessen, 2014).

Both Halliday (1993) and Vygotsky (1978), whose views Wells (1994) described as complementary, have influenced my beliefs regarding learning and cognitive development, and the role language plays in both of them. According to Vygotsky (1978), cognitive development occurs on two planes in which learners move from one involving external speech to another involving internal speech (i.e., thinking) (Lantolf & Thorne, 2006). For Vygotsky, language is the most important mediational tool facilitating this cognitive development (Wells, 1994). Halliday (1993), however, centralizes the role of language even further, essentially suggesting that language development is more than a means for cognitive development. Two sides of the same coin, language learning represents cognitive development itself (Halliday, 1993; Wells, 1994), or, as Halliday (1993) put it, “the ontogenesis of language is at the same time the ontogenesis of learning” (p. 93). According to him, the development of abstract thought and the understanding and use of abstract language are two concurrent developments (Halliday, 1993; Wells, 1994). Learning and the ontogenesis of cognitive and communicative ability occur as humans expand their potentials to construe and make meaning (Halliday, 1993; Wells, 1994).

A view that language is central to learning and the development of cognition would stress that it is important to explore the language and semiotic choices the doctoral students employed in this dissertation in order to develop a deeper understanding of their perceptions and beliefs regarding educational technology. Therefore, I believe concepts from multimodality (Kress & van Leeuwen, 2006; Serafini, 2014; Unsworth, 2006), which are informed by social semiotics

and its related field of SFL (Halliday & Matthiessen, 2004, 2014), along with inductive analysis (Patton, 2002, 2015), helped me to explore in relatively more depth the meanings the participants expressed in this dissertation's four primary data sets (online asynchronous discussions, digital stories, digital surveys, semi-structured interviews).

Summary

Educational technology plays a major role in L2 education (Otto, 2017). Some of the factors affecting the ways teachers employ ET in their classrooms are their “technology, pedagogy, and content knowledge” (Koehler & Mishra, 2009, p. 60) (i.e., TPACK) and their ET-related beliefs (Borg, 2006; Hismanoglu, 2012). Influences upon their TPACK and beliefs are likely to include ET-related experiences they had during their teacher education classes and practica (Heo, 2009). In turn, the beliefs of teacher educators, who design teacher education curricula, course learning activities, and pre-service practica, may have an impact on pre-service teachers' learning experiences, and therefore may in turn influence their perceptions of educational technology as well. As a consequence, a need exists to conduct research related to the perceptions of teacher educators. Therefore, in this dissertation, I explored the education technology-related beliefs of doctoral students in an educational technology and second language acquisition program who are likely to become L2 teacher educators in the years following the dissertation's research. The participants, as future academics, are also likely to conduct research that contributes to knowledge in these fields. Therefore, I believe my dissertation has the potential to contribute to the body of literature on the beliefs of academics who will have an impact on future L2 education.

I began Chapter 1 with an overview of this dissertation and a discussion of its genesis. Following this, I provided an outline of the remainder of the Chapter 1. Then, I discussed the

background of the dissertation, the education-related problems I attempted to address with it, and its purpose and significance. Then, after the listing the *a priori* questions guiding this dissertation's research, I offered operational definitions of terms and concepts that appear in this dissertation and then described the epistemological and theoretical beliefs that shaped my research approach. In the following, final section of Chapter 1, I describe the contents of the remaining dissertation chapters.

Dissertation Outline

In Chapter 2, I first review recent research related to teacher cognition, language teacher cognition, and pre- and in-service teachers' beliefs regarding educational technology. The use of online asynchronous discussion threads and digital storytelling in teacher education follows. The employment of multimodal concepts in the analysis of research data concludes the discussion of Chapter 2. In Chapter 3, I discuss the dissertation's context, participants, data collection, and qualitative research methods. In Chapter 4, I delineate and discuss the findings. In Chapter 5, I conclude this study by first summarizing its findings, followed by a discussion of the pedagogical and research implications. Thereafter, I identify the dissertation's limitations before I offer some distinct recommendations for future research and practice.

CHAPTER 2: LITERATURE REVIEW

Introduction

The purpose of Chapter 2 is to review the extant literature in the fields relevant to this dissertation, identify gaps in them, and provide a rationale for conducting this study (Burke & Soffa, 2018). The first of the four major topics of research in Chapter 2 covers literature related to teacher cognition, language teacher cognition, and pre- and in-service teachers' beliefs about educational technology, the primary focus of the dissertation. The second section covers research on the use of online asynchronous discussion threads in teacher education. The third section provides a review of studies in which pre- or in-service teachers created digital stories as part of their coursework in education classes. The digital storytelling and online asynchronous discussion threads comprise the educational activities in the second and third sections of the literature review. These activities represented 60% of the dissertation participants' final course grade and provided rich data regarding these participants held about educational technology. The fourth section reviews the research on multimodal data analysis methods. This review I included herein because I believed multimodal analysis of the digital stories will provide a much deeper insight into the participants' beliefs regarding educational technology, and because I wish to deepen my understanding of multimodal analysis while promoting its use in L2 education research. Following the review of this literature, I identify gaps in the literature related to the combinations of the data types I collected and the methods I employed to explore the data and types of participants (i.e., doctoral students). I also offer reasons why I believe this dissertation

may help fill those gaps. I then discuss the theoretical concepts undergirding this dissertation's research. Finally, I conclude Chapter 2 with a summary of its contents.

Teacher Cognition, Language Teacher Cognition, and Beliefs about ET

Research indicates that teachers' beliefs can have a major impact on their classroom practices (Borg, 2006, 2018). As educational technology continues to play a prominent role in L2 education (Otto, 2017), there exists a need to explore the beliefs of doctoral students who are likely to both design and implement language teacher education curricula, and publish research, the latter of which may influence the ET-related beliefs of future L2 teachers. In this section of Chapter 2, I provide overviews of research in the fields of teacher cognition, language teacher cognition, and pre- and in-service L2 teachers' beliefs regarding educational technology. The reason for the first topic, teacher cognition in general, is that it encompasses the narrower field of language teacher cognition. An overview of teacher cognition provides context for the following two sections. The reasons for the second and third parts—language teacher cognition and the ET-related beliefs of pre- and in-service L2 teachers—is that these topics are the primary focus of this dissertation.

Teacher cognition. Teacher cognition is a major focus in current teacher education research (Bruzzano, 2018; Burns, Freeman, & Edwards, 2015). Among the reasons for this is the belief that a better understanding of what teachers know or believe can help provide insights into how to help them develop into not only better practicing teachers but also to become more fully participating members of communities of practice (Borg, 2006; Bruzzano, 2018; Johnson, 2006; Shulman & Shulman, 2004). I begin this section on teacher cognition with a brief discussion of its origins and then offer an operational definition of it.

Origins of teacher cognition. Research on what teachers know, believe, or perceive goes back to at least the 1980s (Burns et al., 2015), or perhaps even earlier, although interest in it grew relatively larger in the 1990s (Borg, 2006, 2012) as researchers recognized that teacher cognitions “are a very powerful influence on classroom practice” (Borg, 1999, p. 23). Developments in teacher cognition research in the latter parts of the 20th century and these first decades of the twenty-first century mirrored developments across the broader fields of education (Birello, 2012). Prior to the interest in teacher cognition, according to Borg, who has published extensively on language teacher cognition (e.g., Borg, 2006, 2012, 2018), teacher behavior was the focus of much teacher education research (Birello, 2012). Interest in teachers’ internal worlds, or what or how they thought, developed around the same time theoretical paradigms in education were in the process of shifting from Behavioralist to Cognitivist epistemologies (Birello, 2012). Understanding what constituted good teachers, and how the field could produce more like them, began to shift from a focus on their behavior to a focus on the inner worlds of what they perceived, knew, or believed (Johnson, 2006). More recent developments in teacher cognition research have recognized the role and influence of context and sociocultural mediation upon teacher cognition and classroom practices (Childs, 2011; Johnson, 2009; Johnson & Golombek, 2011; Kitade, 2015; Kubanyiova & Feryok, 2015; Öztürk, & Yıldırım, 2019).

Definitions of teacher cognition. Multiple researchers have employed different conceptions of teacher cognition and approached research on it from different perspectives (Borg, 2006, 2012). Thus, while choosing or developing one definition of teacher cognition may pose challenges, the following definition by Borg (1999) seems suitably comprehensive and appropriate for the purposes of this dissertation: “the store of beliefs, knowledge, assumptions,

theories, and attitudes about all aspects of their work which teachers hold and which have a powerful impact on teachers' classroom practices” (p. 19).

Beliefs: a teacher cognition construct. One characteristic of teacher cognition research is that researchers in this field have employed a great variety of concepts or constructs (Borg, 2006). According to Borg (2006), “[t]he field is characterized by an overwhelming array of concepts” (p. 35), including *beliefs* (e.g., Ford, 1994; Pajares, 1993), *perspective* (Tabachnick & Zeichner, 1986), *cognition* (e.g., Kagan, 1990), and *content knowledge* (e.g., Grossman, Wilson & Shulman, 1989). However, in this dissertation, I focus mainly upon *beliefs*. Defining *beliefs* is not an easy task as different authors view them in different ways, and it is not always easy to distinguish *beliefs* from other cognition concepts, such as *knowledge* (Bruzzano, 2018; Pajares, 1992). Zheng (2009) offered the following relatively detailed definitions and descriptions of *beliefs*: “First, ‘belief’ is a subset of a group of constructs that name, define, and describe the structure and content of mental states that are thought to drive a person’s actions” (p. 74). To this Zheng added,

Moreover, beliefs are often defined as psychologically held understandings, premises, or propositions felt to be true. As a result, beliefs are the permeable and dynamic structures that act as a filter through which new knowledge and experience are screened for meaning. (p. 74)

In addition, in addressing Harvey’s (1986) discussion of belief systems, Zheng stated that “[b]elief systems therefore serve as a personal guide by helping individuals define and understand the world and themselves (Pajares, 1992)” (p. 74). I believe an important aspect of the concept of *beliefs* is that they not only include subjective perceptions of the way things *are*, but also include individuals’ perceptions of the way things *should be*. Both aspects of beliefs are

important because with this dissertation I sought to explore the participants' beliefs about not only the conditions of current educational technology and its use, but also their beliefs about ET-related changes they foresee, expect, or desire.

Language teacher cognition. In this section of the literature review I focus on research on language teacher cognition. On this subject, multiple authors have authored theoretical papers, literature reviews (e.g., Borg, 2006; Bruzzano, 2018; Tondeur et al., 2017; Zheng, 2009), and empirical studies (e.g., Öztürk & Yıldırım, 2015; Ceyhan-Bingöl & Özkan, 2019). The topics related to teacher cognition upon which they have conducted research include idiomatic language (e.g., Lontas, 2013, 2017), grammar (e.g., Borg, 2006; Sato & Oyanedel, 2019; Watson, 2015), writing (e.g., Lontas, 1990, 2007; Ngo, 2018; Yang & Gao, 2013; Yigitoglu & Belcher, 2014), corrective written feedback (e.g., Lee, 2009; Şakrak-Ekin & Balçıkanlı, 2019), oral corrective feedback (e.g., Rahimi & Zhang, 2015), multilingualism (e.g., Griva & Chostelidou, 2011), and educational technology (e.g., Lontas, 2018a; Sadeghi, Rahmany & Doosti, 2014), which is a primary focus of this dissertation.

In this section, I review relatively recent individual empirical studies on language teacher cognition to provide an overview of the extant research. The topics of the language cognition studies I review, in the order that they appear, are corrective feedback on oral communication (Rahimi & Zhang, 2015); L2 oral communication (Farrell & Yang, 2017); Communicative Language Teaching (CLT) (Zhu & Shu, 2017); intercultural communicative competence (ICC) (Gong, Hu, & Lai, 2018); second language writing (Ngo, 2018); intercultural language teaching (Oranje & Smith, 2018); English as a lingua franca and related issues (Ceyhan-Bingöl & Özkan, 2019); reading (Farrell & Guz, 2019); self-reported cognitions and classroom practices (Öztürk & Yıldırım, 2019); written corrective feedback (Şakrak-Ekin & Balçıkanlı, 2019); and integrated

grammar instruction (Sato & Oyanedel, 2019). I would note, however, that the studies reviewed here are what I intended to be a representative sample of the different types (i.e., targeting different aspects of L2 education) of language teacher cognition studies that have appeared in recent years (2015–2019). I do not presume to suggest that I have reviewed anything approaching every extant study on the subject of language teacher cognition (see Table 1 for a list of the studies on language cognition that I review here). Note that I do not include any studies on language teachers’ beliefs about educational technology here; these I review in the following section.

Table 1

Studies in Literature Review on Language Teacher Cognition

Study	Subject
Rahimi and Zhang (2015)	corrective feedback for oral communication
Farrell and Yang (2017)	oral communication
Zhu and Shu (2017)	Communicative Language Teaching
Gong, Hu, and Lai (2018)	intercultural communicative competence (ICC)
Ngo (2018)	sociocultural ontogenesis of a writing instructor
Oranje and Smith (2018)	intercultural language teaching (ILT)
Ceyhan-Bingöl and Özkan (2019)	English as a lingua Franca
Farrell and Guz (2019)	an EAP reading instructor’s beliefs and practices
Öztürk and Yıldırım (2019)	teaching and learning beliefs and practices
Şakrak-Ekin and Balçıklı (2019)	written corrective feedback (WCF) beliefs and practices
Sato and Oyanedel (2019)	integrated grammar instruction beliefs and practices

Rahimi and Zhang (2015) conducted a mixed-methods study with 40 non-native EFL instructors at private language institutions in Iran in which they compared the differences between novice and veteran instructors’ beliefs regarding corrective feedback (CF) for oral communication. Analysis of Likert-scale survey items and interview data indicated the two groups differed in their views. One difference was that veteran teachers tended to base their cognitions on teaching experience, while novice instructors employed their own learning experiences. Another difference related to preferences for types of CF: while both groups

perceived value in recasts, experienced instructors also perceived value in explicit CF and clarification requests. The findings indicated experienced instructors tended to be more aware of context, individual student differences, and the nature of student errors when providing CF, and thus more flexible regarding the types of CF they provided.

Farrell and Yang (2017) conducted a descriptive and exploratory qualitative case study in which they explored the beliefs, practices, and the (dis)alignment of beliefs and practices of an EAP instructor who taught oral communication. A rationale for the study was the authors' belief that instructors need to become aware of and reflect on beliefs and practices in order to address any discrepancies between the two and to develop as professionals. To triangulate the data, Farrell and Yang observed lessons, conducted pre- and post-class interviews, and collected lesson plans. The authors identified three major groups of belief-related themes: teaching oral communication, instructors' roles, and students' roles. The findings indicated the participant's beliefs were mostly consistent with her practices. One example of consistency was stating teachers should be "leaders" and "facilitators," which she exemplified by continuously helping individual students throughout her lessons. An example of inconsistency is that while she believed students should take the lead in their own learning, she was the one who tended to initiate question-and-answer exchanges. The authors noted that, previously, the participant had rarely reflected on her beliefs, practices, and the (in)consistencies between them, and suggested that an implication of the findings was the importance of promoting reflective practice in professional development.

Zhu and Shu (2017) conducted a longitudinal ethnographic study on communicative language teaching (CLT) at a public middle school (Grades 7–9) in China that involved a veteran teacher who had participated in in-service training. The authors focused on changes to the

participant's cognition (e.g., beliefs about CLT) and classroom practices (e.g., employing CLT). The findings indicated that over the course of the study, the participant progressed from being an advocate of traditional grammar instruction to believing that while CLT had value, grammar-focused instruction was still also important for helping students to perform well on high stakes exams. Zhu and Shu pointed out that research indicates that a willingness to change, which the participant possessed, may be a precursor for actual change in cognition (Carless, 1997; Ellis, 1997; Van den Branden, 2006). Observations of the participant's lessons indicated that after the project, she employed roughly half her class time to CLT methods, her classes were less teacher-centered, and her students' engaged in learning activities and took more control of their learning.

Gong, Hu, and Lai (2018) conducted a study focusing on Chinese-as-a-second-language (CSL) university instructors' cognition regarding intercultural communicative competence (ICC) and contextual factors that may influence it. They employed a survey to explore the 43 participants' ICC knowledge, ICC-related teaching objectives, and perceptions of their university contexts (e.g., university's surroundings, technological and academic resources, other faculty). The results indicated the instructors possessed varying levels of knowledge about different aspects of Chinese culture, and that they valued teaching intercultural skills more than intercultural attitudes or knowledge. The instructors' perceptions of positive contextual factors correlated positively with their own ICC knowledge and their goals for developing their students' ICC knowledge.

Ngo (2018) conducted a study focusing on a second language writing instructor at a public university in Viet Nam, changes to her cognition, and the impact of sociocultural mediation upon these changes. Ngo, who stressed the need to recognize the sociocultural context of language teacher cognition, applied sociocultural theory (Vygotsky, 1978) to explore the

ontogenesis of the instructor's cognition. Ngo found that material, conceptual, and human factors played roles in the substantive cognition shifts the instructor underwent. The strongest mediating factors appeared to be the participant instructor's own instructors, and her apprenticeships (Rogoff, 1995) to become instructors of EAP and "English for standardized exams" (p. 82).

Oranje and Smith (2018) conducted a mixed method studies in which they compared the intercultural language teaching (ILT) cognitions and practices of L2 secondary school teachers in New Zealand. The authors collected data with a survey that included items they developed themselves and items they borrowed from other instruments, including a large-scale one that Sercu et al. (2005) employed to explore L2 teachers' focus on developing students' Intercultural Communication Competence in seven different countries. The findings indicated that while the teachers generally valued ILT, in practice, however, most of them focused more of their classroom time on teaching language rather than culture. A similar example from the findings is that while 50% of the teachers considered teaching/learning culture to be "very important," the number of teachers who rated discrete aspects of language competence (listening, vocabulary, speaking) as "very important" was even greater. The findings also indicated that positive scores for ILT cognition or practices had the highest positive correlations with the teachers belonging to educational associations and having knowledge of covert culture, which the authors defined as 'everyday culture' (p. 319).

Ceyhan-Bingöl and Özkan (2019) conducted a mixed-methods study with 36 EFL instructors at a Turkish university to explore their beliefs and practices regarding culture, varieties of English and English speakers, English as a lingua franca (ELF), and other related topics. The findings indicated the instructors were generally aware of and interested in ELF issues, including a perception that English is a global language with local variations, neither

superior nor inferior, of which students should become aware. Additionally, the instructors believed it important to introduce students to different cultures, develop their acceptance of those cultures, and improve their intercultural competence. The authors determined that the six participants whose teaching they observed engaged in classroom practices that were generally consistent with their stated beliefs. The instructors introduced their students to cultural content and issues, and focused more on students' communication effectiveness than on their grammar or pronunciation errors, which the authors stated was consistent with "ELF reality" (p. 95).

Farrell and Guz (2019) conducted a study in which they explored an EAP instructor's beliefs about L2 reading, classroom practices, and the (in)consistency between her beliefs and practices. For data collection, the authors observed the instructor's lessons, interviewed her before and after those lessons, and compared her lesson plans to actual practices. Through coding, Farrell and Guz identified beliefs regarding language learning, teaching L2 reading, and language teaching in general. Observations of the instructor's lessons indicated that most of her stated beliefs and actual practices were consistent, although some inconsistencies also existed. Examples of congruence were that the instructor focused on developing her students' overall language abilities, cultural understanding, and the academic skills they would need for their future studies, all of which the instructor had supported in her stated beliefs. An example of incongruency was the instructor employing extensive reading activities while not believing it would be effective for her students. The authors stressed the importance of reflection on beliefs and practice as a means for instructors to improve their teaching.

Öztürk and Yıldırım (2019) employed a Likert-scale survey with over 600 university EFL teachers to explore the correlations between their self-reported cognitions and classroom practices. The survey focused on classroom practices and beliefs regarding teaching and learning

in general, and teaching and learning languages in particular. The results of the survey indicated the EFL teachers with traditional attitudes toward language education (e.g., preferring approaches that are more teacher-centered in nature, placing relatively more importance on knowledge about language than actually communicating with it) tended to employ traditional teaching and learning practices that were less learner-centered and less focused on communication.

Şakrak-Ekin and Balçıkanlı (2019) conducted a mixed-methods study in which they explored and compared the written corrective feedback (WCF) beliefs and practices of 25 university-level EFL instructors in Turkey. The participants believed their feedback had a positive impact on students' writing abilities, and reasons they cited for providing it were to develop students' awareness of mistakes and to help them avoid repeating those mistakes. However, while the majority of the participants stated they preferred to provide selective feedback, employ error codes, and highlight student errors without directly stating what they were, analysis of their actual practices indicated they tended to correct all errors directly. The reasons for these discrepancies included perceived constraints such as lack of time, student preferences, or students' inability to understand such feedback. Furthermore, while the participants stated that they preferred to focus on global errors (e.g., contents, purpose), analysis of the data indicated they actually focused much more on local errors (e.g., grammar, mechanics). However, Şakrak-Ekin and Balçıkanlı indicated that they could not discern the reasons for these discrepancies from their analysis of the data.

Sato and Oyanedel (2019) conducted a mixed-methods study in which they explored the integrated grammar instruction beliefs and practices of EFL teachers in Chile. Nine teachers participated in focus group discussions, and 498 responded to a survey. The results of the study

indicated the teachers shared some beliefs, such as perceiving value in student-centered communicative learning practices, and that grammar can be learned through communicative activities. However, Sato and Oyanedel also identified different types of conflicting beliefs among the EFL teachers that were related to different understandings of learning theories, experiences employing textbooks and communicative learning, and beliefs about the appropriateness of communicative learning, versus teacher-centered learning, in the Chilean cultural context. One example is that while the EFL teachers generally perceived value in integrated grammar instruction, which may have been a result of teacher training, some veteran EFL teachers appeared to resort to traditional methods in which grammar instruction was decontextualized.

As this sample of eleven studies suggests, language teacher cognition research exists on a wide variety of topics across L2 education. A commonly stated rationale for these studies is that language teacher cognitions (e.g., beliefs) often influence classroom practices (e.g., Farrell & Guz, 2019; Farrell & Yang, 2017; Öztürk and Yıldırım, 2019), although this was not always the case (Oranje & Smith, 2018; Sato & Oyanedel, 2019). While some authors relied on self-reported data, such as surveys, to support claims about the influence beliefs may have on practice, (Oranje & Smith, 2018; Rahimi & Zhang, 2015; Sato & Oyanedel, 2019), other authors observed lessons to learn about language teachers' actual practices (Ceyhan-Bingöl & Özkan, 2019; Farrell & Guz, 2019; Farrell & Yang, 2017). The findings from all the studies support the need to better understand pre- and in-service teachers' beliefs, which may influence classroom practice, and thus provide further rationale for conducting this dissertation.

Beliefs about educational technology. The previous sections were reviews of recent research on teacher cognition and language teacher cognition. In this section, the focus narrows

to research on in- and pre-service teachers’ beliefs about educational technology, which relates to the major focus of this dissertation—the ET-related beliefs of doctoral students who are likely to become, if they are not already, L2 educators and/or L2 teacher educators. However, as I could not identify many studies on this topic solely within the field of L2 education, I included research on this subject from other disciplines. The studies reviewed here are listed in Table 2.

Table 2

Studies in Literature Review on ET Beliefs

	Study	Discipline
1	Vannatta and Fordham (2004)	multiple subjects
2	Ertmer et al. (2012)	multiple subjects
3	Kim et al. (2013)	multiple subjects
4	Deng et al. (2014)	multiple subjects
5	Toffoli and Socket (2015)	EFL
6	Hlas et al. (2017)	multiple foreign languages
7	Liu et al. (2017)	EFL
8	Yerdelen-Damar et al. (2017)	Science
9	González-Carriedo and Esprivalo Harrell (2018)	dual language program
10	Joo et al. (2018)	multiple disciplines
11	Orhan Goksun et al. (2018)	Computer Education and Instructional Technologies Program
12	Canals and Al-Rawashdeh (2019)	EFL
13	Alsuhaibani (2019) (concept paper on CALL beliefs and practices)	L2 education

In a quantitative study involving K-12 teachers in six schools, Vannatta and Fordham (2004) employed a survey instrument they had developed, “the Teacher Attribute Survey” (p. 255), to explore which teacher disposition factors, or a combination of factors, predict how frequently teachers employ multiple types of educational technology. The predictive disposition factors they surveyed were “teacher self-efficacy, teacher philosophy, openness to change, amount of professional development, amount of technology training, years of teaching, hours worked beyond the contractual work week, and willingness to complete graduate courses without

salary incentive” (p. 254). Employing forward multiple regression, the authors found that the three factors which predicted the participants’ frequency of technology employment were willingness to spend their own time on work, an open mind about change, and the amount of time they spent training in technology.

Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) employed a mixed-methods multiple case study design to compare in-service teachers’ pedagogical beliefs with their actual educational technology practices. The authors purposefully recruited twelve participants who had won awards related to their use of educational technology with students. The framework of this study was research by one of the authors, Ertmer (1999), on *first-* and *second-order* barriers to technology integration. The former type are barriers “external to the teacher” (p. 423), such as materials and ET-related education. The latter type of barriers are “internal to the teacher” (p. 423), such as ET-related perceptions and beliefs. The study’s data consisted of the participants’ websites, interviews, and a Likert-scale survey. Analysis of the survey items indicated the factors the teachers perceived to be the greatest barriers to technology integration were dispositions of other teachers, a lack of technology support, state standards, and financial resources, all of which were first-order barriers. Two of the three items with the lowest scores, meaning the participants perceived them as less serious barriers, were the teachers’ own beliefs and competence with technology, both of which were second-order barriers. Analysis of the teachers’ websites indicated two of the teachers’ websites “supplemented the required curriculum,” six of their websites “supported the existing curriculum,” and three of them “facilitated an emerging curriculum” (p. 429). The three teachers whose practices fell into the third category employed educational technology to develop transformative pedagogies and viewed educational technology as a means “to experiment, implement, and refine these new

approaches to teaching and learning” (p 431). Website analysis also determined that eleven of the twelve teachers’ pedagogical practices and stated views were consistent.

Kim, Kim, Lee, Spector, and DeMeester (2013) conducted a quantitative study in which they explored the correlations among in-service teachers’ technology integration and their beliefs regarding epistemology and pedagogical practices. A rationale for this study was previous research had identified teacher beliefs as a potential *second-order barrier* to the integration of technology (Ertmer, 1999, 2005). The authors employed the *Epistemological Belief Questionnaire* (Schommer, 1990) to quantify the participants’ epistemological beliefs, and the “Teaching, Learning, and Computing (TLC) survey” (p. 79) (Becker, 2000, 2001; Becker & Anderson, n.d.) to determine whether their beliefs were more teacher- or student-centered. To assess the levels of the participants’ technology use (Hall, Dirksen, & George, 2006), the researchers employed an observation protocol and semi-structured interviews, respectively. They employed the Concerns-Based Adoption Model (Ellsworth, 2000) to develop the semi-structured interview questions. To code the interview transcripts, the authors employed *Levels of Use* (Hall et al., 2006). The results indicated that student-focused pedagogical beliefs and “more sophisticated epistemolog[ical]” (p. 81) beliefs correlated positively with the teachers’ use of educational technology as a means of learning rather than as an end to itself.

Deng et al. (2014) conducted a quantitative study in which they explored the relationships among in-service teachers’ beliefs regarding pedagogical practices, epistemology, and methods of educational technology use. They collected data from 396 high school teachers in Guangdong, China by employing a Likert-scale instrument consisting of items from other surveys that focused on the factors they wished to investigate. Analysis of the data provided statistically significant evidence that constructivist views on pedagogy and “sophisticated beliefs” (p. 253)

regarding the infallibility of knowledge sources (e.g., teachers) are predicting factors for employing educational technology in a constructivist manner. The mean score for survey items on constructivist uses of educational technology was 3.89 on a 5-point Likert scale, which suggested that many of the teachers preferred these types of teaching/learning approaches to traditional ones.

Toffoli and Socket (2015) explored the perceptions of 30 EFL instructors at French universities regarding “Online Informal Learning of English (OILE)” (p. 7). The authors stressed that since OILE and formal learning interact with each other, and because many students devote considerable time to the former, research is needed on OILE. The participants believed only 44% of their students participated in OILE, which contradicted an earlier study by Toffoli and Socket (2010), who found the actual number was 97%. While the instructors had mixed beliefs about OILE, the majority believed it positively impacted learning, including improvement of motivation and confidence, and reduction of speaking anxiety. In addition, roughly half the instructors indicated their students’ OILE affected how they taught. Perceived *cons* of OILE included its potential to cause passive learning without critical thinking, and worries that the acquired language might be inappropriate for academic contexts. Furthermore, the instructors believed employing students’ OILE resources at school could raise concerns, such as copyright issues and unwarranted interference in students’ private lives. Citing arguments by Lund (2006), Toffoli and Socket concluded that instructors may better meet the needs of students, who frequently engage in OILE, by becoming “mediators” who help them discern and understand the types of L2 discourse they encounter online.

In a mixed-methods study, Hlas, Conroy, and Hildebrandt (2017) explored pre-service foreign language teachers’ beliefs about CALL technology and its uses for pedagogical and

private reasons. The authors recruited 71 teachers across the United States and asked six of them to participate in semi-structured interviews. While the majority of teachers rated themselves at either novice (49.5%) or intermediate (38%) levels with CALL technologies, many of the teachers indicated it was important for foreign language teachers to develop their CALL-related knowledge. One of the interview participants stated that, for today's students, not using CALL in the classroom "is like disconnecting them from their world" (p. 347). While 22 of the survey respondents indicated their teacher education programs had provided them with CALL training, 31 indicated their programs had not offered any CALL training. Some of the interview participants indicated they were not prepared to use some of the educational technology their schools employed. Some participants also noted ET-related support was lacking, and one even indicated her cooperating teacher was generally unwilling to use some types of educational technology. Survey results regarding field experiences indicated the teachers frequently had their students employ technologies such as grammar sites and dictionaries, and engage with websites where they could encounter the target language in a variety of modalities such as music, video, and digital texts.

Liu, Lin, and Zhang (2017) employed a version of the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989) they had adapted to survey 202 EFL instructors at universities in Southern China about their pedagogical beliefs, beliefs about ICT, and plans to employ ICT. To their version of TAM, the authors added items about pedagogical beliefs to determine whether the instructors' views aligned more with Constructivist or Transmission approaches to teaching. The authors also stressed that it was important to conduct research on instructors across the disciplines because the cultures of different disciplines may influence perceptions of educational technology. The findings showed the participating instructors

generally held pedagogical beliefs more consistent with Constructivist than Transmission models of teaching. The instructors' Constructivist beliefs also correlated positively with three TAM constructs: "perceived usefulness," "perceived ease of use," and "intention to use" (p. 756). Conversely, Transmission beliefs only had positive and statistically significant correlations with "perceived usefulness." The results of the study generally indicated that instructors who preferred Constructivist approaches to pedagogy were more accepting of educational technology.

Yerdelen-Damar et al. (2017), who conducted a quantitative study with 665 pre-service science teachers in Turkey, examined relationships among multiple technology factors, including the teachers' TPACK, "attitudes towards technology, their technological competency, frequency of technology use in their daily life, and computer ownership" (p. 395). The authors employed four different survey instruments to obtain data on these factors (Canbazoglu Bilici, Yamak, Kavak, & Guzey; 2013; Karaca, Can, & Yildirim, 2013). They performed structural equation modeling with the resulting data which provided them with statistical relationships among the multiple variables for which they sought results. From their data analysis, the authors found the participants' ET-related attitudes, competence, and experiences were statistically significant factors that predicted self-efficacy. In addition, the evidence suggested experience with educational technology was a statistically significant predictor of attitudes regarding educational technology ($\beta = 0.14, p < 0.05$).

González-Carriedo and Esprivalo Harrell (2018) conducted a mixed-methods study in which they explored the ET-related attitudes of kindergarten and elementary school teachers in a dual language program in Texas. The authors interviewed the nine teachers, and eight of them completed the "Teachers' Attitudes toward Computers survey" (p. 117) (Christensen & Knezek, 2009), which consisted of Likert-scale items and "semantic differential scale items" (p. 117). For

the latter type of items, respondents choose a number between one and seven on a scale with two adjectives that are opposites, such as *dull* and *exciting*, to indicate their feelings about computers (Christensen & Knezek, 2009; González-Carriedo & Esprivalo Harrell, 2018). Results indicated most of the dual immersion teachers chose responses on the neutral to positive side of the 7-point scale regarding the following feelings about computers: *comfortable*, *exciting*, *fresh*, *likeable*, *pleasant*, and *absorption*. However, they were generally divided in their views regarding *accommodation* (wanting to accept or avoid new computer technology), *concern* about computers' negative or positive impact on society, and the degree of *comfort* they felt using computers. Moreover, the teachers generally did not believe computers promoted "higher order thinking skills" (p. 124), and six of them indicated concerns about computer use resulting in social isolation and less interaction. From the interview data, the authors identified major themes: the teachers' positive perceptions regarding the potential contributions computers can make in bilingual education and in education in general, and the teachers' concern that the unavailability of resources could hamper their ability to employ computers effectively.

Joo et al. (2018) surveyed nearly 300 pre-service teachers in three Korean universities to determine if their TPACK (Schmidt et al., 2009) influenced their perceptions of their own self-efficacy, the "ease of using technology" (p. 48), and technology's usefulness. The authors also investigated whether all of these factors had any impact on the pre-service teachers' intentions to employ educational technology in their classes. To construct a survey for their study, the authors borrowed and modified survey instruments on the following subjects: TPACK (Schmidt et al., 2009); intentions to employ technology (Taylor & Todd, 1995); and ease of use (Davis, 1989), usefulness (Davis, 1989), and self-efficacy (Schwarzer et al., 1999). Statistical analysis of the survey data indicated TPACK correlated positively with self-efficacy and perceptions regarding

technology's ease of use and usefulness. The authors also found that perceptions about ease of use correlated positively with usefulness, and intentions to employ technology in the future correlated positively with perceptions about self-efficacy and technology's usefulness and ease of use.

Orhan Goksun, Filiz, and Kurt (2018) conducted document review (Bogdan & Biklen, 1998; Creswell, 2012) on infographics that pre-service teachers in Turkey had created to express what they imagined were representative examples of educational technology in the future, present, and past. The time spans for these periods were 2015–2050, 2001–2014, and 1950–2000. The authors coded the infographics deductively (Patton, 2002) with three predetermined themes, future, present, and past educational technologies, and counted how many times each of these codes were present in the data. Analysis indicated educational technologies of the *past* and *present* occurred most frequently in the infographics. The three technologies that appeared most commonly in the *past* portions of their infographics were CDs, television, and cell phones. The three most commonly occurring educational technologies for the *present* were smartboards, online courses, and the internet. And, finally, the three most commonly appearing *future* technologies were holograms, virtual classrooms, and “Real e-books” (p. 141). I would note that while the participants in this study expressed *what* they thought representative educational technologies of the three time periods (future, present, past) were, this project did not involve them in making subjective evaluations about those technologies.

Canals and Al-Rawashdeh (2019) conducted research to explore the educational technology-related perceptions of instructors at a university in Jordan who had taught online EFL courses. Regarding computer confidence, the instructors indicated they employed, created, and “train[ed] students to use” (p. 651) CALL technology in their teaching. The discrete English

skills the instructors most frequently targeted were listening and speaking. The instructors expressed the following beliefs: it is more important for students to be able to employ CALL to develop listening, speaking, and reading skills than writing or grammar skills; and CALL should help students develop problem-solving skills. The instructors also indicated they enjoyed employing CALL and the internet to teach. However, they indicated concerns about computers reducing instructional time and student interaction. Through qualitative analysis of interviews, the authors identified three themes: (1) educational technology helped the instructors provide students with effective materials, communicate with students, and respond to struggling students' needs; (2) while educational technology benefitted students in some programs more than others, it enabled the instructors to continuously assess their students and provide feedback; and (3) the training the instructors had received for the online courses was inadequate for teaching EFL.

Alsuhaibani (2019) authored an article in which she discussed research on L2 teachers' CALL beliefs and practices. The author identified potential impediments to the implementation of CALL, which included resource limitations (e.g., Akcaoglu, 2008), a lack of competence with or knowledge of CALL (e.g., Aydin, 2013; Dashtestani, 2012), and “[i]nflexible curricula” (p. 726) (e.g., Park & Son, 2009). Another finding of the review was that while multiple studies support the hypothesis that educational technology beliefs influence ET-related practices (e.g., Albirini, 2006; Al-Zaidiyeen, Mei, & Fook, 2010; Gilakjani & Leong, 2012), other studies suggest that positive beliefs about ET may not positively impact the use of ET in classrooms (e.g., Akcaoglu, 2008; Dashtestani, 2012; Egbert, Paulus, & Nakamichi, 2002; Kim, 2002). In addition, Alsuhaibani (2019) identified the following influences on L2 teachers' CALL-related beliefs:

technological competence and personal experience (Albirini, 2006; Park and Son, 2009;

Capan, 2012), cultural perceptions (Albirini, 2006; Capan, 2012), age (Albirini, 2004; Akcaoglu, 2008), years of experience in teaching (Tezci, 2009), and the institution and work place (Akcaoglu, 2008; Suwannasom, 2010). (p. 724)

In this section of the Chapter 2, I reviewed studies on pre- and in-service teachers' beliefs about educational technology in various contexts and disciplines. The findings indicated that while the participants in these studies possessed diverse views about educational technology use in L2 education, overall, their perceptions were generally positive. In addition to ET-related cognition, some of the studies (Deng et al., 2014, Hlas et al., 2017; Joo et al., 2018; Liu et al., 2017) also collected data regarding teachers' actual or planned use of educational technology. The findings in Deng et al. (2014), for example, provided evidence that instructors' orientations toward pedagogy (i.e., Constructivist- or Transmission-oriented paradigms) correlated with the ways in which in which they employed ET. However, the literature review by Alsuhaibani (2019) offered examples of studies that provided evidence both for and against the perception that teachers' beliefs may have an impact on their actual educational technology use.

Online Asynchronous Discussion in Teacher Education

Overview. In this section I discuss recent research on the use of online asynchronous discussion in teacher education. Online asynchronous discussions were one of the dissertation participants' major course assignments (20% of the final grade), one of this dissertation's primary data sources, and the focus of Research Question 1. The subject of multiple empirical research studies (see, for example, Batareló Kokić & Rukavina, 2017; Hambacher, Ginn, and Slater, 2018a, 2018b), online asynchronous discussion is important in the field of education because through dialogue pre-service teachers can share experiences and co-construct knowledge (Chieu & Herbst, 2016; Johnson et al., 2017). However, another reason many pre-service

teachers engage in online asynchronous discussion is that the number of online and hybrid courses that universities offer has increased (Otto, 2017). While many studies exist on the use of online discussion threads, I discuss here what I hope is a representative sample (see Table 3 for a list of the individual studies).

Table 3

Studies in Literature Review on Discussion Thread Use

	Study	Discipline or Subject of Course
1	Szabo and Schwartz (2011)	Educational Psychology
2	Chieu, Kosko, and Herbst (2015)	Geometry education
3	Chieu and Herbst (2016)	Geometry education
4	Batarelo Kokić and Rukavina (2017)	Distance Education
5	Johnson et al. (2017)	“field experience course” (p. 41)
6	Hambacher et al. (2018b)	classroom management course
7	Hambacher et al. (2018a)	“Classroom Management: Creating Positive Learning Environments” (p. 243)
8	Suh and Michener (2019)	six different TESOL courses

Review of individual discussion thread studies. One example of research on this topic is a study by Szabo and Schwartz (2011), who conducted a mixed-methods study in undergraduate educational psychology courses to compare changes in critical thinking skills between students who had participated in online discussions and those who had not. For quantitative data collection purposes, participants in both groups took “the Ennis-Weir Test of Critical Thinking (Ennis & Weir, 1985)” (p. 84) at the start and conclusion of their courses. They also took “Canfield’s Learning Style Inventory (Canfield, 1992)” (p. 84) to control for individual learning preferences. The results of the pre- and post-tests provided statistically significant evidence the critical thinking skills of students who participated in online discussions improved more than those of the students in the control groups. In addition, the authors employed rubrics based on Bloom’s revised taxonomy (Anderson & Krathwohl, 2001) to quantitatively analyze whether the experimental (online discussion) group’s posts reflected changes in critical thinking

over the course of the school term. The results provided statistically significant evidence the online discussion group's critical thinking had improved. With qualitative analysis methods also involving Bloom's revised taxonomy (Anderson & Krathwohl, 2001), the authors additionally found anecdotal evidence that the students engaged in increasingly higher levels of thinking (Anderson & Krathwohl, 2001) throughout the school term.

Chieu, Kosko, and Herbst (2015) conducted a study in which pre-service and novice teachers enrolled in an education course in a university in the Eastern US viewed and discussed teaching techniques geometry teachers had employed in a web-based tool called *LessonSketch* [sic]. The videos included *critical events* in which the teachers, who were cartoon characters, failed to instruct in ways the study participants might have expected. The course instructor employed these critical events to focus the pre-service and novice teachers' attention on pedagogical practices and to serve as topics of discussion. Employing concepts from Systemic Functional Linguistics (SFL) (Halliday & Matthiessen, 2014) and Appraisal Theory (Martin & White, 2005), the study's authors performed content analysis on the discussion thread posts, which involved the critical events, to determine whether the pre-service and novice teachers' evaluation of teaching methods in the videos impacted their "reflection on their professional practice and proposal of alternative teaching actions" (p. 35). In addition, quantitative analysis of the discussion threads provided evidence the quantity of the pre-service and novice teachers' evaluations correlated positively with how much they "proposed alternative teaching actions and reflected on instructional practice" (p. 35).

While Chieu, Kosko, and Herbst (2015) conducted analysis of individual students' posts, in another study involving similar (or perhaps the same) participants, interventions, and methods, Chieu and Herbst (2016) shifted the unit of analysis to *parent-child* posts (Tu, Blocher, &

Gallagher, 2010; Wang, Wang, Zhai, & Han, 2011) in which pre-service and novice teachers responded to each other's writings. The purpose was to explore how evaluation in the *parent* posts correlated with responders' "reflection on teaching practice and... proposal of alternative teaching actions" (p. 139). Chieu and Herbst quantitatively coded the *parent* posts for the presence of evaluation and the *child* posts for the presence of reflection and *alternativity* (Herbst & Chazan, 2006). *Alternativity* refers to making suggestions regarding other methods teachers might have employed in a given instructional scenario. Chieu and Herbst found the probability of a *child* post containing reflection was only 58.7% if the *parent* post lacked evaluation; however, the probability rose to 80.4% when *parent* posts included evaluation. In addition, while only 38.5% of *child* posts included *alternativity* if evaluation was absent in the *parent* post, the percentage rose to 58.1% if evaluation was present. The results of this study suggest that the presence of evaluation in *parent* posts regarding teaching methods could increase the likelihood of *child* posts containing reflection and alternativity. The results furthermore suggest that one pre-service or novice teacher's engagement in and expression of critical thinking has the potential to positively impact the complexity level of other participants' contributions to a dialogue.

In another study, Batarelo Kokić and Rukavina (2017) explored the ways in which the perceptions and knowledge of pre-service teachers, who were enrolled in a blended education course, evolved over the course of discussions in two separate discussion threads regarding open resources and tools for education. From the Interaction Analysis Model (Gunawardena, Lowe, & Anderson, 1997), Batarelo Kokić and Rukavina developed codes they employed in content analysis of both discussion threads. The first stage of the Interaction Analysis Model is when discussants compare or share information and the fifth and final stage, which is generally more

desirable, is when they apply or express newly constructed knowledge (Batarelo Kokić & Rukavina, 2017; Gunawardena et al, 1997). The authors found the pre-service teachers engaged in different stages of collaborative knowledge construction in both discussion threads, although the second discussion thread involved relatively higher stages. They suggested possible reasons, including sequencing (the influence of the first thread upon the second) and differences in instructor participation levels in the discussions. Another important finding was that discussion activities in both threads failed to engage the pre-service teachers in the fifth (highest) stage of collaborative knowledge construction.

In a study involving undergraduate students at a Canadian university who participated in field training, Johnson et al. (2017) explored how design factors impacted the complexity level of learning (Entwhistle & Entwhistle, 2005; Marton, Dall’Alba, & Beaty, 1993) that occurred in two iterations of online discussions. Johnson et al., contrary to what some (including myself) may assume, asserted that surface learning has value in that it can facilitate deep learning (Diaz & Diniz, 2014; Marton, Hounsell, & Entwistle, 2005). One example they provided is that “memorization can be a strategy for developing deep learning” (p. 38). Johnson et al. additionally suggested that intentionality, or purposeful choice, with learning strategies helps to achieve deep learning. The authors employed a model of content analysis, which Henri (1992) had developed to characterize levels of participation in discussions, to explore data from two online asynchronous discussion threads. They found that while most of the students’ posts were interactive in nature (62.70% in the first iteration and 57.27% in the second), the second most frequently occurring type of posts involved exhibitions of cognitive activity with the potential to lead to knowledge acquisition (35.11% and 29.09%, respectively). They further found evidence that deep learning had occurred. In addition, survey and interview data indicated the

undergraduate students had positively perceived various aspects of the discussion threads, including having “a clear discussion framework” (p. 47) and features that promoted engagement (e.g., choice of topics), collaboration, and reflection.

A more recent example of research on this topic is a study by Hambacher et al. (2018b), who explored education majors’ perceptions of how instructor-designed discussion activities promoted deep learning and the development of a Community of Inquiry (Garrison, Anderson, & Archer, 1999) involving “cognitive presence, social presence, and teacher presence” (Hambacher et al., 2018b, p. 152). To facilitate these discussions, the authors developed a “First Responder/Connector” online asynchronous discussion model, which they described in more detail in another article [see the discussion of Hambacher et al. (2018a) below]. The education majors indicated the affordances of online asynchronous discussion had provided them with opportunities to develop and express their ideas effectively. They also positively perceived engaging in structured discussions involving a degree of autonomy, having defined discussion roles, and participating in small groups consisting of the same members throughout a school term.

Another article by the same authors (Hambacher et al., 2018a) focused on the challenges teacher educators face in designing and implementing online asynchronous discussion activities that engage pre-service teachers in deeper discussions and the collaborative construction of knowledge. In this article, which is more of a concept paper than an empirical study, the authors advanced their first responder/connector discussion model, based on a Community of Inquiry framework (Garrison et al., 1999), as a means to deepen the level of dialogue among pre-service teachers in online asynchronous discussion threads. According to the authors, four features of their model promote the development of a social presence (Garrison et al., 2001) that can

facilitate deep discussion and collaborative construction of knowledge: “forming small learning communities, assigning roles and responsibilities, rotating roles and setting intervals for interaction, and balancing structure with flexibility” (p. 244). They also stressed that teacher presence (Garrison et al., 1999, 2001) “as a coach or model” (Hambacher et al., 2018a, p. 249) is necessary for deep discussion and collaborative learning to occur.

Suh and Michener (2019) conducted a study with in-service teachers who had enrolled in an online TESL course offered by a university in the Northeast of the US. Employing concepts from dialogism (Bakhtin, 1981, 1986; Vygotsky, 1978) and Linguistically Responsive Teaching (LRT) (Lucas & Villegas, 2013), the authors explored the prompts and contents of online discussion threads. They found that the discussion prompts enabled the in-service teachers to engage with multiple aspects of the LRT (e.g., “advocacy for ELs,” “scaffolding instruction for ELs” (p. 7), and dialogism (e.g., “Perspective Taking,” “Negotiation,” p. 6). Analysis of the contents of randomly chosen discussion threads indicated the in-service teachers tended to employ the same dialogic engagement patterns and LRT elements that the prompts requested. However, Suh and Michener (2019) noted that compared to other LRT elements, the in-service teachers did not as frequently address topics related to power or perspective taking. The implications of the study included recognition that that well-written discussion thread prompts may afford opportunities to engage in critical dialogue about pedagogical skills (e.g., LRT) and help teachers take alternative perspectives, particularly those of their students.

Summary. The discoveries of the studies in this literature review generally indicate online asynchronous discussion threads can promote deeper thinking (Johnson et al., 2017; Szabo & Schwartz, 2011) or the collaborative construction of knowledge (Batarello Kokić & Rukavina, 2017) for pre- or in-service teachers, especially when classmates’ posts exhibit critical

thinking qualities (Chieu & Herbst, 2016), or teacher educators provide structure or guidance (Hambacher et al., 2018b; Johnson et al., 2017; Suh & Michener, 2019). However, while the participants in Johnson et al. (2017) generally preferred structured discussions, they also appreciated freedom with some aspects, such as topics or modality (written posts, multimodal posts). Furthermore, some studies indicated online discussion threads have the potential to form communities of peers who create and share knowledge (Batarelo Kokić and Rukavina, 2017; Hambacher et al., 2018b; Johnson et al., 2017).

Digital Storytelling in Teacher Education

Overview of research on digital storytelling. In this section, I provide a review of recent research on the use of digital storytelling in teacher education. I include this section in the literature review for the following two reasons: (1) the digital stories the participants collaboratively created (*DS+*) are a main source of data in this dissertation—this project represented 40% of their final course grade it was a major subject of attention for the participants; (2) Research Questions 2 and 3 focus on the digital storytelling project. It is for these reasons that I delve more deeply into digital storytelling research compared to the other literature sections of the literature review. Here I review 16 studies I consider to be a representative sample, in terms of contexts and disciplines, of the use of digital storytelling in teacher education.

I begin this digital storytelling section of the literature review by providing an overview of the contexts, participants, and themes addressed in the 16 different digital storytelling studies (see Table 4). Following this, I discuss each of these studies in relatively more detail. In this group of studies, I also included two studies (Aşık, 2016; Kildan & Incikabi, 2015) involving the TPACK framework (Koehler & Mishra, 2009; Mishra & Koehler, 2006) and one study

(Røkenes, 2016) employing the Digital Bildung framework (Krumsvik, 2014) because their research and this dissertation share a focus on both digital storytelling and educational technology. Finally, I conclude this section of Chapter 2 on digital storytelling use in teacher education with a summary of its contents.

Contexts of digital storytelling research. Researchers have conducted studies involving digital storytelling and L2 teacher education in various contexts for a variety of reasons. The studies within this literature review took place in a number of countries: Australia (Ng & Nicholas, 2015), France (Kalyaniwala-Thapliyal, 2016), Norway (Røkenes, 2016), South Africa (Gachago, 2016), Turkey (e.g., Aşık, 2016; Bozdogan, 2012; Göçen Kabaran & Alkan Karademir, 2017; Karaoglan Yilmaz & Durak, 2018; Kildan & Incikabi, 2015; Kocaman-Karoglu, 2016), and the United States (e.g., Heo, 2009, 2011; Liontas, in press-b; Matias & Grosland, 2016; Shelton, Archambault, & Hale, 2017; van Galen, 2017). These studies involved participants in undergraduate (e.g., Heo, 2009, 2011; Maddin, 2012; Matias & Grosland, 2016), master's (Røkenes, 2016; van Galen, 2017), and PhD-level (Liontas, in press-b) courses. The levels of education the participants in these DS-related studies teach, or will teach, include preschool (Göçen Kabaran & Alkan Karademir, 2017), primary school (e.g., Kalyaniwala-Thapliyal, 2016; Kildan & Incikabi, 2015; Shelton, Archambault, & Hale, 2017), and secondary school (Røkenes, 2016). The subjects or disciplines the participants teach or will teach include science (Ng & Nicholas, 2015), mathematics (e.g., Karaoglan Yilmaz & Durak, 2018; Kildan & Incikabi, 2015), English as a foreign language (e.g., Aşık, 2016; Bozdogan, 2012; Røkenes, 2016), or a variety of foreign or second languages (Liontas, in press-b). Some of the authors, however, did not identify the students' disciplines (e.g., Gachago, 2016), or their studies' participants included students from different disciplines (e.g., Heo, 2011).

Table 4

Studies in Literature Review on Digital Storytelling

	Study	Participants' Majors	Course Topic/Discipline	DS Topic / Focus of Study	Location
1	Heo (2009)	unidentified (perhaps multiple)	multiple educational technology courses	"Why do I want to be a teacher?" (p. 414)	US
2	Heo (2011)	multiple, including foreign language	multiple educational technology courses	"Why do I want to be a teacher?" (p. 70)	US
3	Bozdogan (2012)	English Language Teaching (EFL)	"Teaching English to Young Learners" (p. 129)	didactic story young students	Turkey
4	Ng and Nicholas (2015)	science	science	reflect on challenging events in practicums and describe resolutions	Australia
5	Kocaman-Karoglu (2016)	"Computer Education and Instructional Technology Department" (p. 1155)	"course about basic principles and methods of teaching and learning" (p. 1156) in "Computer Education and Instructional Technology Department" (p. 1155)	"future career plans" (p. 1156)	Turkey
6	Matias and Grosland (2016)	"urban teacher program" (p. 152)	"cultural diversity in urban education" (p. 156)	"teacher candidates to deconstruct their own identities" (p. 157)	US
7	Gachago (2016)	one participant whose major was unidentified	unidentified	"engage with difficult topics, such as race, class, gender and sexuality, uncomfortable issues that are frequently resisted in today's South Africa. Furthermore ... increase their awareness of the systemic inequalities that govern our classrooms" (p. 301)	South Africa
8	Kalyaniwala-Thapliyal (2016)	EFL	"Applied Methodologies for Teaching English" (p. 5)	didactic: "for teaching English as a foreign language" (p. 1)	France
9	Göçen Kabaran and Alkan Karademir (2017)	pre-school education	"Teaching Practice II" (p. 374), which included a practicum	didactic	Turkey
10	Shelton et al. (2017)	primary school education	course on "Sustainability Science for Teachers" (p. 60)	"engage K–8 students with a sustainability topic" (p. 60)	US

Table 4. (Continued)

11	van Galen (2017)	M.Ed. students who are in-service teachers; disciplines unidentified but levels include kindergarten and primary school	“ <i>Telling our Stories as Teachers</i> , a summer course that I [the author] teach[es] in a M.Ed. program for inservice teachers” (p. 85)	“pivotal moments of their teaching, narrating themselves as protagonists in their stories” (p. 85)	US
12	Karaoglan Yilmaz and Durak (2018)	mathematics education	“Computer II” course	didactic: to teach mathematics	Turkey
13	Liontas (in press-b)	SLA and Educational Technology	SLA and Educational Technology	promotion of educational technology / language teacher identity	US
Studies Employing TPACK framework (Mishra & Koehler, 2006; Koehler & Mishra, 2009)					
14	Kildan and Incikabi (2015)	early childhood education	mathematics education	didactic: to teach mathematics	Turkey
15	Aşık (2016)	EFL	“Teaching English to Young Learners” (p. 57)	“create digital stories for their future students to be used as materials in their language classrooms” (p. 58)	Turkey
Study Employing Digital Bildung (Krumsvik, 2014)					
16	Røkenes (2016)	EFL “and other languages disciplines” (p. 316)	“A [digital storytelling] workshop was arranged every spring semester before the student teachers entered their school practicum” (p. 317)	“The learning objective of the workshop was to familiarize the student teachers with the DST [digital storytelling] method.” (p. 317)	Norway

Foci of digital storytelling studies. Digital storytelling studies have involved a variety of issues related to teacher education. Just the fifteen I review here include foci on teacher identity (e.g., Gachago, 2016, Lontas, in press-b), teacher resilience (e.g., Ng & Nicholas, 2015), developing awareness of and engagement with social issues (e.g., Gachago, 2016; Matias & Grosland, 2016; van Galen, 2017), and reflecting on challenging experiences (e.g., Ng & Nicholas, 2015). Other studies have focused on skills or knowledge pre-service teachers need to acquire, such as TPACK (e.g., Aşık, 2016; Kildan & Incikabi, 2015), Digital Bildung (Røkenes, 2016), and linguistic competence for pre-service teachers who will teach a second or foreign language (e.g., Røkenes, 2016). Another reason the authors or the participants' universities engaged the pre- or in-service teachers in digital storytelling projects was to add digital storytelling to the pre- or in-service teachers' arsenal of teaching tools (e.g., Aşık, 2016; Shelton et al., 2017).

Review of individual digital storytelling studies. In this section I review 16 individual studies on the use of digital storytelling in teacher education (see Table 4 for a list of these studies). I purposefully chose studies from different disciplines and contexts in order to provide a representative sample. For each study I describe the context, methods, and discoveries.

Heo (2009, 2011) conducted two studies involving undergraduate education majors and digital storytelling projects with the rationale that digital storytelling projects provide authentic learning experiences for pre-service teachers (Maina, 2004). In her 2009 study, Heo employed a semi-experimental design to explore pre-service teachers' self-efficacy and dispositions regarding educational technology. Analysis of pre- and post-treatment survey responses indicated that for the majority of the items there was statistically significant evidence of improvement of the participants' reported self-efficacy. Most of the pre- and post-treatment

survey items on the integration of educational technology also provided statistically significant evidence the participants' dispositions had improved. However, such evidence was lacking for items related to willingness to engage in training and spend their own unpaid time working to integrate technology into their classrooms.

Heo (2011) conducted another similar study, but instead of including pre-service teachers from different years in university, as she did in her 2009 study, in this study only first-year university students participated. Heo's rationale for conducting a digital storytelling project with new students was that "[t]he theory of self-efficacy suggests that efficacy is most malleable early in learning, and once efficacy is established, it tends to be resistant to change (Hoy & Spero, 2005)" (p. 66). As with her 2009 study, the topics of the digital stories were why the participants wanted to become teachers. Statistical analysis of the survey data indicated that while the means of 19 of 21 survey items on self-efficacy had improved, only three of those 19 items had statistically significant improvements. Those three items regarded confidence with the following: awareness of curricular goals and employment of technology during the design of assessment, providing feedback to students, and assessing software. Six of seven survey items on dispositions showed improvement; however, the only one that was statistically significant related to a desire to continue instructional technology-related professional development even if it were not a requirement to maintain a teaching license. Although Heo (2011) stressed that "self-efficacy is malleable (Abbitt & Klett, 2007; Wang et al., 2004), even within a very short duration (Heo, 2009a)" (p. 75), the participants worked on their digital stories for just one week, which could be a reason why only four of 28 survey items provided statistically significant evidence of improvement. However, Heo pointed out that high mean scores on the pre-test meant the students could not improve much. She suggested this could be a result of the pre-service teachers

being from the “Net Generation” (p. 76) and feeling confident in their digital competence before engaging in the digital storytelling project.

While Heo (2009, 2011) and most of the other authors in this literature review focused on the processes, learner outcomes, and/or perceived learner outcomes of digital storytelling projects, other studies, including Bozdogan (2012) and Ng and Nicholas (2015), which I discuss here, focused more on the contents of pre-service teachers’ digital stories. Bozdogan (2012) conducted a study in which EFL pre-service teachers created didactic digital stories for young learners. She employed content analysis (Krippendorff, 1980) to explore the topics of the digital stories, characteristics of the digital stories’ characters, and moral values expressed or implied in the digital stories. The most commonly occurring topics and moral values in the digital stories were “the importance of friendship through sharing and helping” (p. 130), and the majority of the characters were anthropomorphized non-humans (e.g., animals) or inanimate objects. Bozdogan noted, however, that some of the portrayals of characters in the stories seemed to promote sexist views of the genders, and she asserted that these types of portrayals have the potential to negatively affect young learners’ perceptions (Gooden & Gooden, 2001; Hamilton, Anderson, Broaddus, & Young, 2006; Taylor, 2003).

Ng and Nicholas (2015) addressed the related issues of teacher resilience and high teacher attrition rate in Australia. A purpose of their study was for science pre-service teachers to develop protective factors promoting resilience by employing the multimodal affordances of digital storytelling to reflect on challenges they had faced during a teaching practicum. The pre-service teachers created and shared their digital stories with VoiceThread, an online tool that enables users to make and publish multimodal digital texts such as presentations, slide shows, and videos (<https://voicethread.com/about/features/#feature-voicethread>). However, it also

allows viewers to post written or audio comments regarding VoiceThread presentations. The authors, who explored the contents of the digital stories, along with the comments classmates posted about those digital stories, found that the former helped them identify a “range of issues (risk factors) and strategies (protective factors)” (p. 736) related to pre-service teachers’ resilience. They concluded that the affordances of digital storytelling enabled the pre-service teachers to express their “thinking and emotions successfully at a deeper level” (p. 736). They also found digital storytelling to be an effective way to explore challenges pre-service teachers had faced and their means for dealing with them.

Kocaman-Karoglu (2016) conducted a mixed-methods study at a university in Turkey with pre-service teachers in a “basic principles and methods of teaching and learning” (p. 1156) course who employed digital storytelling to explore their visions and preparations for their future teaching careers. Kocaman-Karoglu, who was also the instructor in the class, conducted semi-structured interviews and two surveys to investigate the pre-service teachers’ experiences, perceptions, and how they think they might have benefitted from the project. The participants perceived that the digital storytelling project had multiple positive outcomes for them, including improved organizational skills, technology competence, self-reliance, self-reflection, and level of sophistication in thinking. Many of the participants also expressed views that digital storytelling is a motivational way to learn and “an attractive way to share course related presentations” (p. 1159). Additionally, they noted that the digital storytelling project afforded opportunities “to experience authentic situations” (p. 1159). However, some of the pre-service teachers indicated they found working alone on their digital storytelling projects to be difficult.

Among the studies employing digital storytelling to investigate social issues, Matias and Grosland (2016) explored the use of digital storytelling in deconstructing the hegemony of

Whiteness in teacher education. They investigated how a digital storytelling project could help pre-service teachers recognize color and emotions, and prevent emotional distancing. The theories underpinning their study were Critical Race Theory (Taylor, Gillborn, & Ladson-Billings, 2009), critical emotional studies (Winans, 2012), and Whiteness studies (Lewis & Manno, 2011). The authors noted that while they had collected about 150 digital stories over four years, for this study they chose to focus on three that reflected themes common to many of the others. Conducting content analysis, the authors found that the three participants employed digital storytelling to critically analyze and commit to deconstructing their previously unrecognized prejudicial perceptions and behavior, such as colorblindness, perceiving their own sentimental fears as more consequential than the tangible fears people of color face, and a lack of emotional investment in opposition to White hegemony. Matias and Grosland pointed to digital storytelling as a means for promoting in teachers, particularly White teachers, an awareness of a need for “sharing the burden of race” (p. 161), instead of relying on teachers of color to do it for them (Williams & Evans-Winters, 2005).

Gachago (2016) conducted a study in which she addressed several issues, including social inequality, pre-service teacher identity, and the potential power of digital stories to invoke empathy in viewers. The theoretical underpinnings of her study were Butler’s (1993, 1999, 2004) work on identity performativity and Barad’s (2007) notion of the entanglements of subject and object. For this study, Gachago chose to focus on an outstanding digital story, or one that “‘glows’ (Maclure 2013, 661)” (p. 301) in posthuman terms. The pre-service teacher employed her digital story as a means to come out as a lesbian to her South African classmates, which, according to Gachago, is a shunned topic in South African education. Her classmates, moved by her bravery, watched her digital story in “complete silence” and gave her “a standing ovation”

(p. 303) afterwards. To develop this study, Gachago explored five events related to the participant's digital story and digital storytelling experience from the perspective of "story, storyteller and audience" (p. 302) to gain insight into not only how the participant performed her identity, but how the audience and her digital story also co-constructed or co-performed her identity. Gachago stressed that digital stories also perform upon their creators.

Kalyaniwala-Thapliyal (2016) conducted a study in which she explored how a group of four first-year undergraduate education majors in France collectively created a didactic digital story for primary school English language learners. The author employed Activity Theory (Engeström, 2001) to structure her study and as a means to analyze the interactions of the education majors while they created their digital story. The education majors and the author identified seven types of *objects* (i.e., activities) in which the education majors engaged. The author analyzed these *objects* for the types of processes they involved (e.g., cognitive, metacognitive, sociocognitive); types of collective activity (e.g., collaboration, cooperation), and expected outcomes (e.g., technical or pedagogical knowledge, reflection). One finding was that the education majors generally participated equally in the work. The education majors also indicated they positively perceived the independence and freedom they had with the processes and contents of their digital stories. Additionally, Kalyaniwala-Thapliyal noted that these education majors accomplished a goal of working autonomously on their digital stories and improving their English language competence.

Göçen Kabaran and Alkan Karademir (2017) conducted an action research project with eight fourth-year kindergarten pre-service teachers in Turkey. In this project the participants, who had no experience with digital storytelling, created didactic digital stories for kindergarten students. The data the researchers collected were interviews and field observations during which

the participants taught lessons and showed their digital stories. The authors employed content analysis to explore the data. Findings indicated the pre-service teachers believed the project heightened their creativity and competence with technology and allowed them to try new teaching methods. One of the most frequently cited challenges was locating suitable images for their digital stories. In addition, all of the participants felt a sense of satisfaction from creating digital stories their kindergarten students enjoyed. Four of the eight participants also believed that digital stories were effective pedagogical tools for every stage in lessons with kindergarten students.

Shelton, Archambault, and Hale (2017) conducted a mixed-methods study in which pre-service teachers created didactic digital stories intended to introduce future K-8 students to a project on sustainability. The authors employed quantitative analysis of Likert-scale survey questions; qualitative analysis of open-ended survey questions; and content analysis (Krippendorff, 2012) and rubric-based assessment of the participants' digital stories. Analysis and assessment of the digital stories indicated the majority of the pre-service teachers had created either *good* or *excellent* quality videos on the topic of sustainability. In the open-ended survey questions, the pre-service teachers noted that both creating narration transcripts and the technical demands of the digital stories were challenging. Analysis of pre- and post-survey Likert-scale items provided statistically significant evidence that the pre-service teachers' had improved in their confidence to create digital stories and their ability to express why digital stories are effective pedagogical tools, both of which were primary objectives of the digital storytelling project. However, the mean score of a post-survey item regarding the pre-service teachers' interest in employing digital stories as a didactic tool was lower, although not statistically so, than the mean for the pre-survey item, which suggests interest or confidence had waned to some

degree. Conversely, interest in having their future students create digital stories increased, although not to a statistically significant degree.

van Galen (2017) discussed and reflected on eight years of having in-service teachers in an M.Ed. program employ digital storytelling to “support reflection on the embodied tensions between agency and shame ... within deeply inequitable social structures” (p. 85). van Galen thought digital storytelling would be an effective way for in-service teachers to explore feelings related to the consequences of differences in power between social classes. To help in-service teachers develop their stories, van Galen dedicated class time to “story circles” (Lambert, 2013) in which they shared ideas and feedback. The author employed inductive coding to explore the contents of three digital stories created by in-service teachers from different socioeconomic backgrounds who worked in Title 1 schools. Title 1 is a designation for “schools with high numbers or high percentages of children from low-income families” (US Department of Education, 2015). In-service teachers at these schools faced pressures and constraints that teachers in wealthier school districts might not. Weaving in theory, van Galen described and discussed the in-service teachers and their digital stories contents in detail. He concluded that digital storytelling enabled the in-service teachers to share stories they had previously not been able to tell. Through digital storytelling, they explored feelings and realizations regarding how socioeconomic conditions prevented them from teaching in a manner that would meet their students’ needs. In this way they found their voices and agency, and confronted socioeconomic-related powerlessness, along with the shame they felt about it.

Karaoglan Yilmaz and Durak (2018) conducted a study with 49 pre-service mathematics teachers in Turkey who employed the steps in Gagné’s (1985) instructional design model to create didactic digital stories. Both the *a priori* research question and open-ended questions on a

survey instrument were the same in that they asked what the pre-service teachers did for each of the nine stages in Gagné's (1985) instructional design model. Karaoglan Yilmaz and Durak employed content analysis (Creswell, 2014) on open-ended survey question data, developing themes and subthemes based on what the pre-service teachers reported they included for each of the nine stages (Gagné, 1985) in their digital stories. The authors reported the most commonly occurring subthemes for each of the nine stages. For example, for stage one of Gagné's (1985) model, which involves "[g]aining student attention and motivating" (Karaoglan Yilmaz & Durak, 2018, p. 1281), the two most commonly occurring sub-themes in the pre-service teachers' self-reports regarding their digital story design were "Creating interesting characters" (p. 1284) and "Environment designing" (p. 1284). In addition, Karaoglan Yilmaz and Durak (2018) provided multiple examples of the pre-service teachers' written answers for each of the nine open-ended questions in the survey. In general, the findings indicated the pre-service teachers included contents in their digital stories that addressed each of the nine stages in Gagné's (1985) instructional design model.

Liontas (in press-b) conducted a digital storytelling study focusing on language teacher identity (LTI) in the same course and with the same participants as this dissertation. Liontas described the digital storytelling projects as "*Digital Stories With a Twist (DS+)*" (emphasis in original) (p. 70) because, among other reasons, the students could make digital stories longer than some authors have suggested (e.g., Bran, 2010; Lambert, 2013) and because the participants made digital stories to employ in professional development training for L2 teachers in K–12 contexts. Their digital stories served as promotional videos for types of educational technologies of the participants' choosing. Liontas discouraged the participants from employing *pathos* ["emotion or passion" (Liontas, in press-b, p. 71)] in their arguments and encouraged them to

employ *ethos* (e.g., credibility of the authors, *logos* (i.e., logic), *sylllogism* [“a deductive three-part logic containing two premises and one valid conclusion” (Liontas, in press-b, p. 71)], and/or *enthymeme* [“a truncated or rhetoric syllogism, an argumentative statement in which one of the major or minor premises is omitted or implied” (Liontas, in press-b, p. 71)]. Liontas found that through these collaborative *DS+* activities, the participants invested effort and emotion to collaboratively construct their identities and express their agency. Liontas recommended *DS+* as a means for providing pre-service teachers with opportunities to exercise agency and actively engage in the construction of their own identities.

TPACK, Digital Bildung, and digital storytelling. Some researchers interested in how education majors’ professional knowledge may relate to a digital storytelling project, or how such a project may affect that knowledge, have turned to the TPACK framework (Koehler & Mishra, 2009), or other technology-related frameworks such Digital Bildung (Krumsvik, 2014), for guidance. TPACK, which stands for “technology, pedagogy, and content knowledge” (Koehler & Mishra, 2009, p. 60), addresses three types of knowledge teachers need, as well as how those types of knowledge interact (Koehler & Mishra, 2009). Technological knowledge is at the core of the framework because many teachers frequently employ technology during pedagogical activities meant to help students acquire content knowledge (Koehler & Mishra, 2009). Without TPACK competence, teachers may find it difficult to instruct students in today’s wired high-tech classrooms (Koehler & Mishra, 2009). A related concept, *Digital Bildung* (Krumsvik, 2014), does not include a *content* component, unlike TPACK, but it does focus on competence with using ICT for personal and pedagogic purposes (Krumsvik, 2014; Røkenes, 2016). Multimodal projects such as digital storytelling are a good fit for studies focusing on TPACK because they involve technology (e.g., video editing), and because they offer pre-service

teachers opportunities to develop their field-specific knowledge and pedagogical skills by creating and employing didactic digital stories with contents aimed at the types of students they will teach in the future. In the following section I discuss two studies involving the TPACK framework (Koehler & Mishra, 2009), Aşık (2016) and Kildan and Incikabi (2015), and one study by Røkenes (2016) involving *Digital Bildung* (Krumsvik, 2014). I discuss these three studies in relatively more detail than some of the other studies because they and this dissertation involve digital storytelling and focus on educational technology.

Kildan and Incikabi (2015) conducted a study in which early childhood pre-service teachers self-evaluated their TPACK (Mishra & Koehler, 2006) before and after completing a digital storytelling project on mathematics education. Employing open-ended survey questions, the authors also collected pre-intervention data on the participants' knowledge, perceptions, and experiences regarding digital storytelling, and post-intervention data regarding their experiences with the digital storytelling project and how they might use digital storytelling in future teaching. The authors also asked the pre-service teachers about their criteria for evaluating both their own digital stories and a model digital story they viewed at the outset of the project. Findings from the pre-survey indicated the pre-service teachers were not sure about the definition of digital storytelling and none of them had ever created one before. The findings for assessment criteria the pre-service teachers employed indicated they emphasized picture and narration quality for both the model digital story and their own digital stories, but for their own digital stories they also focused on qualities related to the stories. In addition, the participants explained the processes they applied during the planning and construction phases of their digital storytelling projects. They cited narrating their digital stories and obtaining images for them as major challenges. The pre-intervention survey items on TPACK indicated most of the pre-service

teachers were confident about only parts of TPACK, such as their *Pedagogical Content Knowledge* (PCK) or *Technological Pedagogical Knowledge* (TPK) (Mishra & Koehler, 2006). Only four of the thirteen participants felt confident about their competence with the intersection of all three types of knowledge (i.e., TPACK) before the digital storytelling project. However, following the digital storytelling project, ten of the thirteen indicated they felt confident about their TPACK.

Aşık (2016) reported on the findings of a mixed methods study in which 78 EFL pre-service teachers at a university in Turkey reported their perceptions of the impact of digital storytelling on their TPACK. The participants were free to choose any type of technological tool to create their digital stories (e.g., Littlebirdtales, My StoryMaker, DomoAnimate) and indicated what they viewed as their chosen tools' *pros* (e.g., "Voice recordable," "user friendly") and *cons* (e.g., "Difficulty in saving," "No stock pictures") (p. 60). The participants also reported that the positive aspects of the products of digital storytelling projects included "watching the final product (TPACK) and sharing and publishing it" (p. 61). Frustrating aspects of the processes of digital storytelling included writing narration transcripts and finding images. Interestingly, many participants cited recording the narration as both a frustrating and positive aspect of the project. Following the digital storytelling project, 79% of the participants reported improved *technological knowledge* (i.e., *TK* of TPACK) (Mishra & Koehler, 2006). The authors also noted the participants perceived they had made gains at the intersection of *technological*, *pedagogical*, and *content knowledge*, or TPACK. The participants additionally suggested numerous ways digital storytelling could be employed as a pedagogical tool, including teaching discrete language skills (e.g., grammar, vocabulary) and having students use it for writing and speaking practice.

Røkenes (2016) conducted a mixed-methods case study at a Norwegian university with two cohorts consisting of both EFL and other foreign language pre-service teachers who participated in digital storytelling workshops, and another cohort of EFL pre-service teachers who did not take part in a workshop but responded to survey questions. Røkenes employed Krumsvik's (2011, 2014) *Digital Bildung* as a framework for the study, but he related it to the TPACK framework (Mishra & Koehler, 2006). The cohort who only took the survey (without participating in a workshop) indicated they generally felt more confident about using ICT for their own personal study and private use compared to how confident they felt teaching with ICT or guiding students to use it. After the digital storytelling workshops, the participants in the other two cohorts indicated they believed digital storytelling has the potential to improve pre-service teachers' and students' ICT competence, as well as pre-service teachers' awareness of educational uses of technology. Some also perceived the value of educational technology from students' perspectives. However, not all of the participants in first digital storytelling workshop finished and/or submitted their digital stories and written reflections because they were not graded assignments. In the second workshop, the digital stories and reflections became graded assignments, which resulted in more of the pre-service teachers making effort to complete them. The organizers of the workshops also asked the pre-service teachers in the second workshop to create their digital stories in pairs and had them share their finished stories in small groups. Some of those participants noted that the digital storytelling project helped them perceive value in employing ICT in English teaching. Some also commented that collaboratively creating digital stories enabled them to overcome challenges related to technology and resources, thus enabling them to concentrate more on the pedagogical aspects of their work. In both iterations of the

workshop, the participants noted they faced challenges related to the employment of intellectual property and credible resources in their digital stories.

Summary of digital storytelling literature review. In this section of Chapter Two, I first provided an overview and synthesis of research involving the use of digital storytelling in L2 teacher education. I began by discussing the various contexts and participants involved with the studies, including the countries where the research occurred; the education levels of the participants and the students they teach or will teach; and the discipline or subject matter the participants teach or will teach. Following this, I identified the topics or subjects of the digital stories the pre- or in-service teachers created in the studies. Then I discussed some recent individual digital storytelling studies in relatively more detail. One of the more common foci was learner outcomes related to educational technology. While Heo (2011) did not find much evidence that participants' ET knowledge or skills had improved, the majority of the participants in the other studies focusing on this topic (Göçen Kabaran & Alkan Karademir, 2017; Heo, 2009; Kocaman-Karoglu, 2016; Shelton et al., 2017), including those involving TPACK (Aşık, 2016; Kildan & Incikabi, 2015) and *Digital Bildung* (Røkenes, 2016), indicated they experienced at least some improvement. The studies involving TPACK were of particular interest because the technical demands of creating digital stories, especially ones involving didactic content material, had the potential to improve the participants' knowledge of technology, pedagogy, and subject matter, along with the intersections of those (i.e., TPACK).

Other studies focused on employing digital stories as a means for both the participants and the researchers to explore issues such as teacher resilience (Ng & Nicholas, 2015) and how teachers' identities intersect with social, economic, and/or racial inequities (Gachago, 2016; Matias & Grosland, 2016; van Galen, 2017). Digital storytelling as a means for to explore and

express language teacher identity was an issue Liantas (in press-b) addressed in his study. Yet another focus of the studies was to explore what the researchers could learn from their contents. Bozdogan (2012), for example, analyzed the stories, character personalities, and moral values that pre-service teachers chose to include in didactic digital stories they created for young children. In another example, Matias and Grosland (2016) analyzed digital stories to explore how the participants viewed issues related to identity, power, and privilege.

Multimodal Discourse Analysis

In this fourth section of Chapter 2, I review some recent literature in the field of multimodal discourse analysis, particularly SFL-based multimodal theory, which informed the analysis of the digital stories that are one of the primary data sources of this dissertation. I begin by reviewing five articles involving multimodal research by O'Halloran (2008), Bezemer and Mavers (2011), Yang (2012), Wu (2014), and Meredith (2016). Thereafter, I discuss a book on multimodal research and education by Jewitt et al. (2016). Finally, I return to Kohrs' (2017) journal article on the state of multimodal research, which I first mentioned in Chapter One, and delineate some of her criticism and suggestions regarding research in the field of multimodality.

In a journal article, O'Halloran (2008) outlines Systemic Functional Multimodal Discourse Analysis (SF-MDA), which is a theory on intersemiotic communication based upon SFL concepts and the work others have done on a number of topics related to multimodality such as *visual grammar* (Kress & van Leeuwen, 1996, 2006), *intersemiotic complementarity* (Royce, 1998), concepts involved with multimodal *mini-genres* such as *meaning compression* (Baldry & Thibault, 2006), and *Locus of Attention* (Cheong, 2004). To these, O'Halloran adds her own contributions to SF-MDA, including work on the concept of *semiotic metaphors* (O'Halloran, 2003).

O'Halloran (2008) explained that the analysis of language and images can involve two strata of meaning-making resources: *content* and *expression*. On the *content* stratum of language, discourse and lexicogrammar enact meaning. On the *content* stratum for images, discourse and grammar enact meaning. The *expression* stratum for language involves “phonology and typography/graphology” (p. 448), and for images, it involves graphics. A major goal of O'Halloran's article seemed to be synthesizing existing ideas and developing her own (e.g., semiotic metaphor) to promote a theory, focused on ideational meaning (Eggins, 2004), that enables analysis of the *expression* stratum for language, both the *content* and *expression* strata for images, and the dynamic semantic interaction between these two modes. O'Halloran additionally provides an example of an application of SF-MDA in which she deconstructed the intersemiotic features of an AIDS awareness campaign poster employed in Singapore in the 1990s.

In a concept paper, Bezemer and Mavers (2011) discussed the challenges of transcribing multimodal texts in general and digital videos in particular. They argued that the theoretical or epistemological backgrounds of researchers necessarily influence transcriptions, and that researchers should recognize this. Social semiotics (Kress, 2010) informed their theoretical perspective. In their discussion of choosing and rationalizing multimodal transcription approaches, the authors provided what I believe are three important questions: “How do I frame the transcript? What do I select for transcription? What do I highlight in the transcript?” (p. 194). The first question, on *framing*, referred to identifying the original purpose of the data (e.g., video recording) and the researchers' goals and theoretical underpinnings. The second question, on *selection*, related to how researchers' perspectives will influence what they choose to include or exclude in their transcriptions. The third question referred to what the researchers choose to

make *salient* in their transcriptions, as well as their manner for doing so. The authors described some examples of multimodal transcriptions (e.g., Erickson, 2004; Mavers, 2009; Norris, 2004) that can serve as guidelines for researchers who transcribe digital videos.

In an empirical study in an L2 learning context, Yang (2012) investigated the processes and products of two pre-service teachers, who were also EFL students, in a digital storytelling project. Yang explored their digital stories by employing the concepts of *transformation* and *transduction* from “Kress’ (2003) notion of design” (p. 225). The former term refers to altering meaning by re-arranging elements within a single mode; the latter refers to employing more than one mode, or shifting modes, to convey intended meanings. Yang discovered that, in order to create their digital stories, the two participants initially created modality units that combined modalities such as language and images. However, “to enhance the message” (p. 227), they later added other modalities, such as music, narration, or animated text. The participants indicated they explored combinations of modalities with multiple intentions: creating heteroglossic texts; easing the audience’s comprehension of the stories; and/or “expressing the changes of the main character’s emotional stances” (p. 228). Yang emphasized that the participants’ choices regarding combinations of modalities were *intentional* (i.e., not arbitrary), which is a key concept in Kress’ (2003) work with social semiotics and multimodality.

In a journal article, Wu (2014) discussed how researchers can explore the relationships between written language and images in picture books by employing concepts from Systemic Functional Linguistics (SFL) (Halliday & Matthiessen, 2004) and concepts from multimodal discourse theories that are also based upon SFL (e.g., Royce, 2007). Wu also mentioned SF-MDA as a means of exploring intersemiosis in texts with pictures and written language. However, Wu failed to provide an in-text citation for SF-MDA, which I presume would be

O'Halloran (2004, 2008). Wu explained that images and written text can work in a complementary inter-semiotic relationship "to form a single and cohesive text" (p. 1416). The manner in which text and images work together is similar to the ways clause complexes operate. According to Systemic Functional Linguistics (Halliday & Matthiessen, 2004), clause complexes either *expand* or *project* each other. With *projection*, one clause expresses locution (speech) or thoughts from the other clause. With *expansion*, the relationship between the clauses involves *enhancement*, *extension*, or *elaboration*. With *enhancement*, one clause qualifies the other. With *extension*, one clause adds new meaning to the other. And with *elaboration*, one clause provides details regarding the other clause. SFL-informed multimodal discourse analysis involves some of the subcategories from these inter-clausal relationships, but it introduces new ones as well. Wu explained in detail how the subcategories of *enhancement*, *extension*, and *elaboration* apply to analysis of logico-semantic relations between texts and images in children's picture books. In addition to her discussion of theoretical concepts, Wu also provided examples of these kinds of text-image relations in famous children's picture books. At the end of the article, Wu offered a generic framework for picture books in the form of a table.

In a concept paper, Meredith (2016) offered an approach to the transcription of multimodal data that she developed from four principles researchers apply in the analysis of spoken language: "accessibility, usability, readability and reflecting the aims of the research" (p. 674). The first principle, *accessibility*, refers to employing symbols that other conversation analysts will understand. In addition, for their own purposes, researchers need to develop transcription processes that focus upon only targeted aspects of multimodal texts in order to provide a level of detail that results in *usability* and *readability* (the second and third principles). The fourth principal involves employing multimodal analysis methods and research goals as the

core determinants of the transcription processes. To illustrate multimodal transcription, Meredith provided an example of the processes and challenges involved with transcribing a synchronous Facebook chat that was primarily text-based but included images such as emoji and the participants' avatars. A challenge in transcribing the text was that as the chat occurred synchronously, and the participants wrote some of their text concurrently, there were time overlaps between their posts. Meredith based much of her process on the Jefferson's (2004) conversation analysis (CA) transcription method, using columns for different types of information such as the communicators' names, elapsed total time, and how long each turn took. For Meredith, another of the challenges in transcribing the synchronous chat was having screen recordings from only one of the participants.

Jewitt et al. (2016) published *Introducing Multimodality* as a textbook for university students and as a resource for authors beginning research on multimodality. In this book the authors provided a broad overview of different perspectives and covered eight different approaches to multimodality studies (e.g., multimodal ethnography, geo-semiotics). However, they focused primarily on multimodal analysis approaches undergirded by Systemic Functional Linguistics (Halliday & Matthiessen, 2004), social semiotics (Halliday, 1978; Kress & Hodge, 1988), and conversation analysis (Sacks, Schegloff, & Jefferson, 1974). The final chapter of the book "presents the practical steps involved in setting up a multimodal study" (p. i). One of the eight elements the authors suggest to consider during multimodal discourse analysis is the transcription of data (Bezemer & Mavers, 2011), which involves, in multimodality terms, "*transduction*, or shifting between modes" (p. 147). One example of *transduction* would be transcribing images with written language.

In the section on multimodality theory in Chapter One of this dissertation, I discussed Kohrs' (2017) claim that the field of multimodal studies is highly eclectic and, as a whole, uncritically accepts new theories or concepts without a set of overarching guiding principles. Here, I turn to some of her specific criticism of multimodal theories as well as her suggestions for ways to advance research in this field. Kohrs critically analyzed some of the theoretical assumptions of seminal work in the field of multimodality, including those in Kress and van Leeuwen's (1996, 2006) *Reading Images: The Grammar of Visual Design*. One of her criticisms regards the authors' claim that the left side of images in Western cultures can represent already known information, and the right side can represent new information. While Kohrs does not mention this, the "given" and "new" correspond to Systemic Functional Linguistics' concepts of *Theme* and *Rheme* in English clauses (Halliday & Matthiessen, 2014). Kohrs pointed out that Kress and van Leeuwen (1996, 2006) were never able to provide satisfactory evidence for these claims. To buttress her call for evidentiary support she cited work by Bateman, Delin, and Henschel (2002), who stressed that empirical evidence is a requirement for developing sound theory. Kohrs' (2017) proposed solution to what she sees as the overly eclectic and confused field of multimodal studies is to turn to "[t]he results and methods of the 200-year-old-discipline of modern linguistics" (p. 2). I think Kohrs' suggestion of applying the work from one thoroughly-researched field (applied linguistics) to a relatively newer field (multimodality studies) is relevant to my dissertation because I employed multimodal theories, primarily Unsworth's (2006) work on image-text relations, that are based upon concepts from Systemic Functional Linguistics (SFL) (Halliday & Matthiessen, 2004).

In this paragraph, I briefly summarize the articles and book on multimodality that I covered in this section of the literature review. O'Halloran (2008) outlined her Systemic

Functional Multimodal Discourse Analysis theory in which she accounted for how texts and images work together to dynamically express ideational meaning on both content and expression strata. Discussing the challenges of transcribing multimodal texts in general and digital videos in particular, Bezemer and Mavers (2011) argued that theoretical or epistemological backgrounds influence transcriptions and that researchers should recognize this. They also offered advice regarding approaches to transcribing multimodal data. Yang (2012) employed the concepts of *transformation* and *transduction* (Kress, 2003) to explore the processes and products of a pre-service EFL teacher's digital storytelling project. Wu (2014), offering a model of the generic structure of picture books, described how images and written language in children's picture books function similarly to the way clause complexes in written language either *expand* or *project* each other's meanings (Halliday & Matthiessen, 2004). Meredith (2016) described and promoted an approach to the transcription of multimodal data that she developed from conversation analysis (Jefferson, 2004). She provided an example of her transcription of a synchronous Facebook chat involving written text and images such as emoji. In a book for students and beginning researchers in the field of multimodality, Jewitt et al. (2016) proposed steps to organize a multimodal study. Providing background for and an overview of multimodal research, Kohrs (2017) suggested that employing concepts from linguistics could serve as a way forward in the eclectic field of multimodal discourse analysis.

Summary of Literature Review

I began Chapter Two with an overview of the contents of the literature review for this dissertation. Then, I reviewed some recent research on pre- and in-service teachers' perceptions and dispositions regarding educational technology. The results of the research generally suggested that pre- and in-service teachers' self-efficacy and beliefs regarding educational

technology have the potential to impact their actual or planned use of it (e.g., Deng et al, 2014; Ertmer et al., 2012; Joo, Park, & Lim, 2018). Next, I reviewed recent research on the use of online asynchronous discussion threads in teacher education. The findings were generally positive and indicated online asynchronous discussion can promote reflection (Chieu, Kosko, & Herbst, 2015), critical thinking (Szabo & Schwartz, 2011), and the collaborative construction of knowledge (Batarelo Kokić & Rukavina, 2017). Thereafter, I reviewed recent literature on the use of digital storytelling in teacher education. The findings of these studies were also generally positive and suggested that engaging in this digital art form can lead to a variety of positive outcomes, including development of competence with target language skills (Abdel-Hack & Helwa, 2014), pedagogical knowledge (Karaoglan Yilmaz & Durak, 2018; Shelton et al., 2017), or a combination of knowledge types such as TPACK (Aşık, 2016; Kildan & Incikabi, 2015). Other positive uses of digital storytelling included improving dispositions toward educational technology (Heo, 2009, 2011), identification of factors related to teacher resilience (Ng & Nicholas, 2015), and engagement in critical examination of identity (Gachago, 2016; Liontas, in press-b), racial hegemony (Matias & Grosland, 2016), and social issues (e.g., van Galen, 2017). In the fourth major section of the literature review, I reviewed literature on multimodal data analysis, including theories informed by concepts from Systemic Functional Linguistics (Bezemer & Mavers, 2011; Jewitt et al., 2016; O'Halloran, 2008; Wu, 2014; Yang, 2012). This included a brief discussion of a book on multimodal research and education by Jewitt et al. (2016) and a journal article by Kohrs (2017) on the current state of multimodal research.

Gaps in the Literature

I believe the combination of the data I intend to employ, my proposed data exploration methods, and the type of participants, as well as the combination of these three factors, make my

dissertation different from other empirical research studies I have been able to locate. In the following sections I discuss how my dissertation covered ground that the studies I discussed heretofore in the literature review did not.

Combinations of data types. While some authors researching subjects similar to this dissertation have analyzed some of the types of data I collected and explored, to my knowledge, none have employed the same combination of data, that is, discussion thread posts, interviews, surveys, and digital stories. For example, Aşık (2016), who collected data from a survey, focus groups, and the participants' written reflections to explore pre-service EFL teachers' perceptions of digital storytelling as a pedagogical activity, did not employ data from discussion threads or explore copies of the participants' digital stories.

Data exploration methods. I believe another way my dissertation differs from other research on similar subjects (e.g., teachers' beliefs about educational technology, digital storytelling) relates to ways in which I explored the data. While some authors have employed multimodal concepts informed by SFL (e.g., O'Halloran, 2008; Wu, 2014) or social semiotics (e.g., Yang, 2012), I am unaware of any who have employed the same combination of theories and concepts (i.e., multimodality concepts informed by SFL) with the same combination of data (online asynchronous discussion threads, semi-structured interviews, surveys, and digital stories). For example, while Wu (2014) and Yang (2012) explored multimodal data, children's picture books and digital stories, respectively, the SFL and social semiotics concepts they employed were different from those in this dissertation. Wu (2014) applied the SFL concepts of *expansion* and *projection* (Halliday, 1994), while Yang (2012) employed Kress' (2003) social semiotic concepts of *transduction* and *transformation*. However, neither author employed Unsworth's (2006) theories on image-text relations.

Participants. Another way in which this dissertation differs from the studies I reviewed in Chapter 2 relates to the types of study participants. Studies I located and reviewed on the topics of ET-related perceptions (Deng et al., 2014; González-Carriedo & Esprivalo Harrell, 2018), online asynchronous discussion threads (Batarelo Kokić & Rukavina, 2017; Chieu, Kosko, & Herbst, 2015) and digital storytelling (Gachago, 2016; van Galen, 2017) primarily involved participants who were in-service teachers, undergraduate education majors, or master's-level students. To my knowledge, there are few studies involving participants at the doctoral level in the field of second language acquisition that focus on educational technology, ET-related beliefs, or digital storytelling, which are the primary foci of this dissertation. Therefore, I believe this dissertation has the potential to make new contributions in these fields.

Theoretical Frameworks

In this section I delineate theories and concepts serving as the theoretical framework of this dissertation. In particular, I focus on multimodal theory, primarily Unsworth's (2006) intersemiotic work on image-text relations, which is based upon Systemic Functional Linguistics (Halliday & Matthiessen, 2004). However, in addition, Kress and van Leeuwen's (2006) visual grammar, which is also based on SFL, and Serafini's (2014) synthesis of multimodal theory, including Kress's (2010) work on social semiotics and multimodality, both also provided overviews of multimodal theories that were useful for developing my understanding of Unsworth's (2006) concepts.

Systemic functional linguistics. I begin the discussion of theories underpinning this study with a brief overview of Systemic Functional Linguistics (SFL) (Halliday & Matthiessen, 2014) because it informs the multimodal theories I employed in this dissertation, Unsworth's (2006) theories on image-text relations. SFL is a descriptive approach to the study of semiotics

that focuses on how meaning is construed and created within cultural and situational contexts (Eggins, 2004; Halliday & Matthiessen, 2014). As it is a systemic as well as functional approach, SFL theory addresses the meaning-making systems that languages offer (Eggins, 2004). These systems are arrayed over three strata of analysis: “phonology, orthography (or graphology) and grammar” (Halliday & Matthiessen, 2014, p. 24). For Halliday and Matthiessen (2014), grammar and lexis “are the two poles of a single continuum, properly called **lexicogrammar** (cf. Hasan, 1987)” (emphasis in original) (p. 24).

According to SFL theory, people use language to simultaneously communicate three global types of meaning or *metafunctions*: *ideational* (which includes *experiential* and *logico-semantic* components), *interpersonal*, and *textual* (Eggins, 2004; Halliday & Matthiessen, 2014). These three metafunctions align with three corresponding aspects of the context of situation: *field*, *tenor*, and *mode* (Eggins, 2004). The *experiential* component of the *ideational* metafunction relates to events language describes or enacts; *field* refers to the subject areas of those activities (Eggins, 2004). The *logico-semantic* component of the *ideational* metafunction focuses on the logical connections (e.g., temporal, cause-and-effect) between clauses (Eggins, 2004). Study of the *interpersonal* metafunction involves analyzing how language reflects and enacts social relations among people; *tenor* is a reflection of those interpersonal dynamics (Eggins, 2004). The *textual* metafunction pertains to the ways in which interlocutors employ mode-specific cohesive devices to create coherence in their texts; *mode* refers to types of communication (e.g., spoken, written, visual) and the role that communication plays in the experience in focus (Eggins, 2004; Halliday & Matthiessen, 2014). Typically, communication involves consideration of all three metafunctions and their corresponding aspects of context (Eggins, 2004). The importance of these three metafunctions and their related concepts, for both

linguistic and visual analysis, is that they aid in the deconstruction and analysis of monomodal and multimodal texts, thus providing insight into what interlocutors try to accomplish with their communication.

Social semiotics and choice. I include a discussion of social semiotics (Andersen, Boeriis, Maagerø, & Tønnessen, 2015; Halliday, 1978) in this dissertation because it relates to, and its theories subsume, both Systemic Functional Linguistics (Eggins, 2004; Halliday & Matthiessen, 2014) and SFL-informed multimodal theory (Kress & van Leeuwen, 2006; Unsworth, 2006). Furthermore, social semiotic concepts proved useful for analysis of the modalities this dissertation's participants employed in their digital stories and discussions posts. One core concept social semiotics and SFL share is the notion of *choice* (Kress & van Leeuwen, 2006). While Saussure, who was an early developer of semiotics, claimed that the development of the *signifier* (i.e., sign) in *signifier-signified* pairs was arbitrary (Chandler, 2002), Kress and van Leeuwen (2006), in their discussion of visual grammar, point out that people do not arbitrarily choose images when communicating. Instead, Kress and van Leeuwen assert, people have communicative *interests* and *intentions* in mind when they choose those semiotic signs. Serafini (2014) agrees with their claim, stating: "The most important consideration is that there is no unmediated association between the actual world or reality and the representations people construct; rather, sociocultural and individual experiences influence the representations constructed and the meanings associated with these representations" (p. 34).

The emphasis on *choice* in social semiotics and SFL (Halliday & Matthiessen, 2014), which informs Unsworth's (2006) intersemiotic theory I employed in this dissertation, is important because it provides a rationale for exploring all the semiotic systems the participants included in their digital stories, which are a primary source of data in this dissertation. The

notion of *choice* suggests they had communicative intentions in mind when choosing or creating the various multimodal elements (e.g., written language, spoken language, background music, still images, video clips) of their multimodal ensembles (Serafini, 2014). These choices, then, express meaning, which is why I focused on semiotic choice in my exploration of the data. Concepts from Unsworth's (2006) intersemiotic work on image-text relations aided me in deductive analysis of the multimodal ensembles in the data.

Multimodality. I include a discussion of multimodal theory in this dissertation because the videos the participants created are multimodal ensembles (Serafini, 2014), and I conducted a multimodal analysis of them to explore the participants' beliefs regarding educational technology. *Multimodality* refers to types of communication, and the study of communication, that involve more than one mode (e.g., speech, written language, visual images, music) (Jewitt et al., 2016; Kress, 2010; Matthiessen, 2007; Serafini, 2014). Serafini (2014) suggested that we view multimodality as existing on a continuum, from multimodal ensembles that are “textually dominant” on one end to those that are “visually dominant” (p. 17) on the other. Serafini also points out that most texts are multimodal. Even texts composed of written language employ various types of *visual paralinguage* (Matthiessen, 2007) to impart meaning, such as types of fonts and layouts (Matthiessen, 2007; Serafini, 2014). To differentiate *modes* from *media*, Serafini pointed out that *media* are means of transmitting modes, such as television or the internet, while *modes* are semiotic systems that transmit meaning (e.g., spoken or written language, images).

Multimodal analysis can involve some challenges, including a plethora of research perspectives from which to choose (Holsanova, 2012; Kohrs, 2017). According to Kohrs (2017), the larger field of multimodality, which is eclectic and “relatively young” (p. 2), has continued to

accrue new perspectives and theoretical frameworks from a variety of disciplines. To illustrate this, Kohrs cites a special issue of the journal *Visual Communication* (2012, Volume 11) on multimodality that includes authors from the fields of “communication and media studies, social semiotics, cognitive science, educational psychology, health studies and visual communication” (Holsanova, 2012, p. 251). Decrying “a lack of focus and agenda” (Kohrs, 2017, p. 3) in multimodality studies, Kohrs criticized researchers who develop new theoretical frameworks and concepts without critically examining and disregarding previously discredited scholarship.

In addition to dealing with eclecticism in the field of multimodal studies (Kohrs, 2017), understanding constructs from multimodality and related theories can be challenging as well. In contrast to visual analysis, concepts related to written language are relatively clearer and more precise, which may be partially due to academic and institutional policing and the ascendant role writing plays in education (Kress & van Leeuwen, 2006). Analyses of both language and visual imagery both require consideration of context, but prescriptive and descriptive grammars are more developed for the former semiotic system (Kress & van Leeuwen, 2006). Some challenges for researchers engaged in visual and multimodal analysis, then, would be to choose appropriate theoretical frameworks from a wide and varied field and to employ theoretical concepts that may not be entirely clear (Kohrs, 2017). With these challenges in mind, in the following paragraphs I address multimodal concepts I employed in the multimodal analysis of the participants’ digital stories.

Unsworth (2006) developed a metalanguage for the analysis of the semiotic interactions between texts and images. Unsworth asserted that there is a need for a metalanguage, or the articulation of concepts, that both researchers and students can employ to analyze multimodal texts in which images and texts work together to express meaning. Unsworth developed

categories of image-text interaction for SFL's ideational, interpersonal, and textual metafunctions.

Image-text relations enacting the ideational metafunction can involve *connection*, *complementarity*, or *concurrency* (Gill, 2002; Unsworth 2006). In image-text relations, *connection* functions in a manner similar to the logicosemantic relations between clause complexes as expressed in SFL theory (Eggins, 2004). One type of image-text *connection* is *projection*, which refers to one of the two modes (i.e., the image or the text) projecting the speech or thoughts of the other mode (Unsworth 2006). An image of a person with a thought or speech bubble would be one example. In the other type of *connection*, *conjunctive relations*, one of the modes represents the cause, place, or time of the other mode (Unsworth 2006). One example would be a poster that visually depicts an event and includes written text representing circumstances (e.g., place, time). These concepts are similar to Kress's (2003) notion of *transduction*.

Complementarity refers to cases in which texts and images separately express different meanings, yet both contribute to an overarching meaning as a whole (Unsworth 2006). Unsworth (2006), citing work by Lemke (1998) and Kress (2003), noted that written language is particularly suitable for depicting the sequential or categorical nature of experiences, and images are better for expressing "spatial relations" (p. 62) and "relationships such as those of degree, gradation, continuous co-variation and dynamic emergence (Lemke, 1998b)" (p. 62). One type of *complementarity* involves *augmentation* of inter-semiotic meanings and another involves *divergence* of meanings.

Concurrency refers to situations in which images and text redundantly express similar or the same ideational meanings (Unsworth, 2006). Unsworth (2006) noted that *concurrency* can

involve *instantiation* in which the texts describe recurring activities with the image being one example of them. Another type of *concurrency* is *exemplification* (Martinec & Salway, 2005), which is a situation in which either the text or the image is a more specific example of the other. I applied these concepts in my exploration of the digital stories. A third type of concurrency, *homospatality* (Lim, 2004), involves a mix of image and text in one unit (Unsworth, 2006). Writing the word *fire* with bold red letters that suggest flames would be one example of *homospatality*.

For image-text relations enacting the interpersonal metafunction, Unsworth (2006) focused on the use of Martin's (2002) Appraisal Theory. According to Unsworth (2006), Martin (2002) "argues that a key function of images is to co-articulate attitude (including Affect, Judgment, and Appreciation)" (p. 69). Another idea of Martin's (2002) is that images can serve as an evaluative starting point, or Theme (i.e., Given), upon which the written text can make comments (Unsworth, 2006). An image in a poster, for example, may suggest an evaluative or subjective backdrop within which written language could operate (Unsworth, 2006). Unsworth (2006) also summarized work on images and texts by Jewitt (2002), who suggested that the positions and relative sizes of written texts in relation to images can also create interpersonal meaning. The use of *framing* in combinations of texts and images is another means for expressing evaluative meaning (Unsworth, 2006). The frames can function to highlight what the author considers important in a multimodal ensemble. Kress and van Leeuwen (2006) also employ the notion of *salience* to refer to what is prominent, and thus important, in an image.

In this section of Chapter 2, I discussed the theoretical concepts I employed to explore the multimodal data I collected, particularly Systemic Functional Linguistics (Eggins, 2004; Halliday & Matthiessen, 2014), social semiotics (Andersen et al., 2015; Halliday, 1978), and

multimodality (Kress & van Leeuwen, 2006; Serafini, 2014, 2015; Unsworth, 2006). These concepts helped me develop a deeper understanding of the perceptions and beliefs this dissertation's participants have regarding the use of educational technology in L2 teaching and learning. As this dissertation is both *descriptive* and *exploratory*, I hope the multimodal data analysis methods I employed may help researchers, including myself, engage in further multimodal research.

Summary of Chapter 2

In Chapter 2, I reviewed recent literature on language teacher cognition, the ET beliefs of pre- and in-service teachers, the use of online asynchronous discussion and digital storytelling in teacher education, and research on multimodal data analysis. Following this, I identified gaps in the literature which this dissertation may help to fill. The gaps involve this dissertation's combination of primary data sources (online asynchronous discussion, digital storytelling, survey, and interviews), the type of participants (doctoral students), and theoretical lenses for data exploration (i.e., multimodal theory). Finally, I discussed the theoretical frameworks that undergirded this dissertation's research and provided viable concepts I employed for the deductive exploration of the data. These theories also inform my epistemological perspectives, and I hope to promote their applications in L2 future research and pedagogy.

CHAPTER 3: METHODS

Introduction

In Chapter 3, I provide details on the methodology of this dissertation. After listing the *a priori* research questions, I discuss the context of the dissertation, and then describe the recruitment process and the doctoral students who agreed to participate. Following this, I discuss the research design, qualitative explorative and descriptive case study (Saldaña, 2011; Yin, 2014), and offer a rationale for it. Then, I describe data collection and discuss the inductive and deductive data analysis methods I employed to explore the data. Following this, I address verisimilitude. Finally, I conclude Chapter 3 with a summary.

A Priori Research Questions

I employed the following *a priori* questions to guide this inquiry:

1. What are the educational technology-related themes embedded in the doctoral students' online asynchronous discussion threads?
2. What are the educational technology-related themes embedded in the doctoral students' digital stories?
3. In what ways do the doctoral students experience a digital storytelling project?
4. How do the doctoral students perceive the use of educational technology in second/foreign language education?

Below, in Table 5, I list the data sources and analysis methods I employed for each *a priori* research question.

Table 5

Research Questions, Data Sources, and Analysis Methods

Research Question	Data Sources	Exploration Methods
(1) What are the educational technology-related themes embedded in the doctoral students' online asynchronous discussion threads?	discussion threads	Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013)
(2) What are the educational technology-related themes embedded in the doctoral students' digital stories?	digital stories	Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013), multimodal concepts (Unsworth, 2006)
(3) In what ways do the doctoral students experience a digital storytelling project?	survey, semi-structured interviews, discussion threads	Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013)
(4) How do the doctoral students perceive the use of educational technology in second/foreign language education?	survey, semi-structured interviews, discussion threads, digital stories	Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013), multimodal concepts (Unsworth, 2006)

Context of Study

Setting. This dissertation took place from 2017 to 2020 at a large public research university located in an urban area in the Southeast region of the United States. The 17 doctoral students who participated in this research were enrolled in a doctoral program in the college of education that focuses on both second language acquisition and educational technology. The university is a Tier 1 research institution (US News & World Report, 2017).

The course in focus. The particular course upon which I focused in this dissertation was a hybrid course (i.e., both face-to-face and online instruction and activities) on applications of educational technology in L2 education. It was a core course in the participants' doctoral program. The course took place in the summer of 2018 and met weekly face-to-face on Tuesdays and asynchronously online on Thursdays for six weeks.

The major assignments for the course were a collaborative digital story (40% of the final grade), weekly posts and responses to classmates' posts in online asynchronous discussion

threads (20% of the final grade), a brief (1000 word maximum) review of a website or software application (20% of the final grade), and an annotated bibliography in which the doctoral students reviewed ten articles related to the use of educational technology in L2 education (20% of the final grade). I discuss the digital storytelling project and weekly discussion thread posts in more detail in the Data Collection section of Chapter 3.

Participants

After receiving approval from my university's Institutional Review Board for this dissertation, I began to recruit participants to participate in it. I met the participants face to face and invited them to participate. I explained what their participation would entail and informed them they had the right to refuse to participate or withdraw their participation at any time without any need to provide a reason. Furthermore, I gave them paper copies of a recruitment flyer (see Appendix A) and informed consent form (see Appendix B). In addition to face-to-face recruitment, to all the participants I sent emails that contained pdf file versions of the recruitment flyers and informed consent forms. All of the students in the course verbally agreed to participate, and I collected signed informed consent from all of them.

Two of the study's four *a priori* research questions focuses explicitly on the participants' digital storytelling project. Therefore, after consulting my major professor and committee members, I decided to conduct semi-structured interviews with two participants from each of the four digital storytelling groups in order to ensure I had collected data representing the experiences and perceptions of a relatively wide sample of the participants. To select the interviewees randomly, my committee chair and I assigned numbers to every participant in each of the four digital storytelling groups. Then, we took turns rolling dice to determine what participants I would interview. For example, a die roll of two meant I would invite the second

person on the group's list of members. We repeated this process twice for each of the four groups until we had chosen eight names. In the end, I wound up interviewing only seven participants because I failed to arrange a time and place to interview one of them. The participant indicated she was busy and could not meet me for an interview so after a delay of several months I decided to proceed without conducting an interview with her.

The 17 participants represent a sample of convenience because they were enrolled in the same university and the same program as I was. In addition, I was friends or acquaintances with some of them. Therefore, it was easy to obtain access to all of the participants. In total, there were sixteen doctoral students enrolled in the course. Furthermore, in addition to these doctoral students, a doctoral candidate (henceforth "Participant 17"), who had attended the course as an observer, agreed to participate in this dissertation. Participant 17 was a member of the same doctoral program as the other participants. I decided to involve him as a participant in this dissertation because he was involved in the production of two collaborative digital storytelling projects, which are part of this dissertation's data.

I collected data from differing numbers of participants for each of this dissertation's four primary data sets (see Table 6). All seventeen participants took part in the digital storytelling project. Fifteen participants engaged in the online asynchronous discussion threads. Participant 17 was unable to access the discussion threads, which were located in the university's Learning Management System (LMS), because he was not 'officially' enrolled in the course. In addition, another student in the course did not write any discussion thread posts. Fourteen of the enrolled students and Participant 17, for a total of fifteen respondents, completed the digital survey. Two of the participants did not complete the survey. Seven students, randomly chosen, took part in the planned semi-structured interviews.

I decided to include Participant 17 in the study because he participated in significant ways in the course. He attended course meetings and was involved in two of the digital storytelling groups. He was one of the two narrators for Group 2’s digital story and an actor in Group 3’s digital story. I believed that if I did not include him in the dissertation as a participant, I would not have been able to collect a significant portion of this data’s dissertation.

Table 6

Participants and Data Types

Data Type	Total # of Participants	Individual Participants
Discussion threads	15	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Digital survey	14	1, 2, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17
Digital storytelling	17	1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
Semi-structured interviews	7	2, 4, 7, 8, 11, 13, 14,

Participant demographic data. In this section, I provide relevant demographic data about the participants (Borg, 2012). While 17 doctoral students participated in this study, I collected demographic data from only 15: fourteen who responded to the digital survey and another participant who took part in a semi-structured interview but not the survey. The participants from whom I collected demographic data were both female and male doctoral students from the following countries: China (2), Cuba (1), Indonesia (1), Kuwait (1), Libya (1), Malaysia (1), Saudi Arabia (3), Turkey (1), the United States (3), and Venezuela (1). (The numbers in parentheses indicate the number of participants from each country.) Two of the participants, Participants 6 (from Libya) and 13 (from the US) indicated they spoke two first languages, while the other thirteen noted they spoke one first language. The first languages of these participants were Arabic (5), Chinese (1) and Mandarin Chinese (2), English (3), Indonesian (1), Malaysian (1), Spanish (3), Tuareg (1), and Turkish (1) (The numbers indicate the number of participants for each language.) While all of the participants were over eighteen

years of age at the time of the course, I did not ask the participants' exact ages, nor any other personal information, as I did not consider this information relevant for the purposes of this study. (For a summary of demographic and other information about the participants, see Table 7, which includes data regarding the participants' gender, nationality, first language, other languages they speak and their self-assessed proficiency levels with those languages, whether or not they participated in the survey and/or semi-structured interviews, and the digital storytelling groups in which they participated.) I obtained most of this data from the digital survey and the semi-structured interviews. In the digital survey and the semi-structured interviews, I asked the participants what languages they spoke and requested they assess their own abilities with those languages. The descriptions of their language abilities presented in Table 7 are the participants' own words. However, some participants failed to provide answers regarding their language abilities; they left that section of the survey blank.

Additional data I collected about the participants were how many ET-related courses the participants reported that they had taken at the university in focus (see Table 8). The participants' doctoral program has a dual focus on second language acquisition and educational technology. According to the program's Program of Study, which listed the required and elective courses, along with required minimum numbers of credit hours for different categories (second language acquisition, education technology, and methodology-related courses), doctoral students had to take three educational technology courses and had the option of taking up to three more ET courses that could serve as electives. Beyond these, the participants were free to take additional ET courses, although these may not have fulfilled the expected program requirements. I would note, however, that at least some of the participants had more education and experience with educational technology than just the courses they had taken at their current university.

Table 7

Demographic Information about the Participants

#	Sex	Country of Origin	Yr. in Program	First Language(s)	Other Languages & Self-Indicated Proficiency Levels	Interview	Survey	DS Group
1	M	Saudi Arabia	2nd	Arabic	“English”	No	Yes	1
2	F	Saudi Arabia	3rd	Arabic	“English-Advanced”	Yes	Yes	1
3	F	NR	2nd	NR	NR	No	No	1
4	F	Venezuela	1st	Spanish	“English”	Yes	Yes	2
5	M	Malaysia	2nd	Mandarin Chinese	“Malay, English”	No	Yes	3
6	M	Libya	3rd	Tuareg and Arabic	NR	No	Yes	1
7	F	Indonesia	2nd	Indonesian	“English (advanced), Tagalog (beginner)”	Yes	Yes	3
8	F	Turkey	2nd	Turkish	“English (Highly Advanced), French (Intermediate)”	Yes	Yes	3
9	F	USA	2nd	English	“Japanese- advanced/highly advanced? L1 Spanish-beginner”	No	Yes	4
10	F	USA	1st	English	“Spanish- Intermediate”	No	Yes	4
11	F	Kuwait	NR	Arabic	English: “intermediate”	Yes	No	1
12	F	NR	NR	Arabic	NR	No	No	1
13	F	USA	3rd	English & Spanish	“Spanish–Native”	Yes	Yes	2
14	F	Saudi Arabia	2nd	Arabic	“English/ Advanced”	Yes	Yes	4
15	F	China	2nd	Chinese	“English, advanced”	No	Yes	3
16	F	Cuba	1st	Spanish	“English/ Highly Advance”	No	Yes	2
17	M	China	5th	Mandarin Chinese	“Advanced”	No	Yes	2 & 3

Note. The number in the leftmost column indicates the participant. “NR” in other columns indicates the participant did not provide information (i.e., no response) regarding that particular category of demographic data. Quotation marks in the “Other Languages & Self-Indicated Proficiency Levels” column indicate those are the participants’ own words. However, some of the participants did not respond to this question. The “Interview” and “Survey” columns indicate whether or not they participated in those data collection activities. “DS” in the rightmost column refers to which digital storytelling group(s) the participant belonged.

Table 8

Participants' Experience with ET-Focused Courses

Participant	# of courses		Participant	# of courses		Participant	# of courses
1	3		7	4		13	6
2	4		8	3		14	4
3	NR		9	3		15	2
4	2		10	1		16	3
5	2		11	NR		17	6
6	5		12	NR			

Protecting participants' privacy. In order to protect the participants' privacy, I assigned them numbers (e.g., Participant 1, Participant 2, Participant 3) rather than use their names. While I collected data about their countries of origin, the languages they speak, their learning experiences, and their beliefs regarding educational technology, I did not collect, and will I not publish, any other personal information that may identify who they are (e.g., age, information about family members). Furthermore, to maintain the privacy of the digital storytelling group members, none of the screen shots from the participants' digital stories that appear in this dissertation display members' faces.

Digital storytelling groups. A digital storytelling project was one of the course's major assignments (40% of the final grade), one of the four primary data sets for this dissertation, and a major focus of this dissertation. The course instructor allowed the course students, and the student who observed the course (Participant 17), to "self-select" the members of their groups. Each group consisted of four or five members. Instead of using pseudonyms for these four groups, I named them Group 1, Group 2, Group 3, and Group 4. While each of the 16 course students participated in only one group, Student 17, a course observer, joined both Groups 2 and 3. In Group 2, he was one of the two narrators, and in Group 3 he acted in the digital story's

skits. (For details regarding group membership and the focus of each group’s digital story, see Table 9.)

Table 9.

Digital Storytelling Groups

Group	Total Members	Individual Participants
1	5	1, 2, 3, 6, 12
2	4*	4, 13, 16, 17*
3	5*	5, 7, 8, 15, 17*
4	4	9, 10, 11, 14

Note. Participant 17, who was an observer in the course but not officially enrolled, participated in Group 2’s digital story as a narrator and Group 3’s as an actor. Therefore, the total member count for digital story participation is 18 instead of 17.

Research Design

In this section I discuss research design and the type of genre I employed in this study, as well as my rationales for choosing them.

Choosing a qualitative approach. I chose a qualitative approach to answer my research questions because this approach would allow me to develop a deeper understanding and rich description of the participants’ beliefs and the context of the study (Leavy, 2014). Borg (2006) pointed out that a qualitative inquiry has enables researchers of language teacher cognition to “portray in rich detail what teachers do and the factors behind their work” (p. 288). The following descriptions of qualitative research and qualitative researchers from Denzin and Lincoln (2005b) support these views:

Qualitative research ... consists of a set of interpretive, material practices that make the world visible ... qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.
(p. 3)

Therefore, I believe a qualitative approach would be the best way to explore and represent the participants' beliefs regarding educational technology and their experiences with a digital storytelling project. However, nine of the items I included in the survey are Likert-scale questions so this study also includes a relatively small amount of quantitative data. I included Likert-scale items because I wanted to collect a rich set of data but was concerned that I may have employed too many open-ended questions on the digital survey. I was concerned that the large number of open-ended questions may have become fatiguing for the participants.

Qualitative genre: exploratory descriptive case study. The following quote by Creswell (2012) suggests this dissertation is a case study:

A case study is an in-depth exploration of a bounded system (e.g., activity, event, process, or individuals) based on extensive data collection (Creswell, 2007). *Bounded* means that the case is separated out for research in terms of time, place, or some physical boundaries. (p. 465)

The *bounded system* for the participants which was the summer course they took on educational technology use in L2 education at their university. Saldaña's (2011) definition of case studies supports this conclusion: "A case study focuses on a single unit for analysis — one person, one group, one event, one organization, and so on" (p. 8). An implication of these definitions of *case studies* in qualitative research is that researchers and other interested parties should not try to generalize the findings to other contexts (Richards, 2006; Stake, 2005).

After determining this dissertation would be a case study, I considered its type or genre. According to Hancock and Algozzine (2011), "[t]hree major types of case study research designs are *exploratory*, *explanatory*, and *descriptive*" (emphasis in original) (p. 37). I believed the purposes of this dissertation made it consistent with both *descriptive* and *exploratory* genres. It is

consistent with *descriptive* genres because, according to Yin (2014), their “purpose is to describe a phenomenon (the ‘case’) in its real-world context” (p. 238). The phenomena of this dissertation are the doctoral students’ beliefs regarding educational technology and their experiences with a digital storytelling project on the subject of educational technology. The context would include the course on educational technology use in L2 education and the doctoral students themselves, who are enrolled in a doctoral program focusing on educational technology and second language acquisition. However, part of the purpose of this dissertation makes it consistent with *exploratory* research genres, which according to Hancock and Algozzine (2011), focus on developing a study design for further research. As some of the goals of this dissertation are to explore having students employ digital storytelling as a means of expressing beliefs, and to explore the use of multimodal theory (e.g., Kress & van Leeuwen, 2006; Unsworth, 2006) to explore those beliefs, this dissertation is also *exploratory* in nature (Hancock & Algozzine, 2011). A goal I have for this dissertation is that it may provide some insights to researchers, including me, who wish to employ multimodal projects and multimodal data analysis in future studies. In sum, I believe characterizing this study as an exploratory descriptive case study seems appropriate because I seek to explore and develop rich descriptions of one group of participants’ beliefs about educational technology and their experiences with a collaborative digital storytelling project, and because I hope what I learn from the methods I employed may help inform future research.

Data Collection

The four primary types of data I collected were copies of asynchronous online discussion threads, copies of digital stories the participants collaboratively created, and the participants’ responses to a digital survey and semi-structured interviews. Other data I collected were a

research journal, the course syllabus, and information I gained from formal and informal discussions with the course instructor. In addition, as a member of the same doctoral program as the participants, I had some personal knowledge of the course instructor and some of the participants.

The reason I collected multiple data types is, as Gibson and Brown (2009) pointed out, “[t]riangulation can be useful for checking the **trustworthiness** of different sources of data (e.g. how accurate a data source is) or for examining the same phenomenon from different points of view” (emphasis in original) (p. 59). These multiple sources of data helped me achieve a deeper understanding and richer description of the doctoral students’ beliefs regarding educational technology and their experiences with a collaborative digital storytelling project.

Online asynchronous discussion thread posts. As a part of the course requirements, the doctoral students engaged in online discussions on a weekly, or near-weekly, basis in which they dialogued regarding their perceptions and beliefs of topics related to the use of educational technology in L2 education. I collected and explored copies of these discussions in order to gain insight into the participants’ beliefs about the implementation and employment of ET in L2 education. The discussions, which took place within the course’s LMS, constituted 20% of the course’s final grade so the participants may have been extrinsically motivated (Dörnyei, 1994) to participate in order to achieve a good final grade in the course. Furthermore, as these discussions consisted of dialogue among the participants, they differed from the digital stories and digital survey responses, whose communication was more unidirectional and less interactive in nature. In these asynchronous online discussions the participants shared, negotiated, and co-constructed knowledge about second language acquisition and educational technology.

To collect the asynchronous online discussion thread data from the course LMS, the course instructor provided me with access to the discussion threads after I obtained permission from the university's Institutional Review Board to commence this study (see Appendix C). I copied and pasted the entirety of the discussion threads, including both text and images, into a Microsoft Word document. When finished, the document was 178 pages long and contained 65,040 words. Both the images and text that participants had highlighted in different colors appeared the same in the Word document as they had in the discussion threads.

According to the course syllabus, the goals of these discussions were to critically reflect on course contents and respond to classmates' posts. The course instructor provided the following directions in his course syllabus (University of South Florida, 2018):

You will be completing various online discussion activities that relate to the CALL/MALL topics, goals, and objectives of the course. The idea here is for you to reflect critically upon the content learned and react to each other's discussion posts with astute professionalism and cultural sensitivity. I will be actively monitoring your contributions before evaluating your thoughts and impressions of your experience therein. Discussion topics will be posted on CANVAS in advance of each session. (p. 5)

As the digital storytelling project was the focus of Research Question 2, I discuss it in detail in Chapter 4.

Digital storytelling project. One of the major assignments in the course, representing 40% of the final grade, was for groups of the doctoral students to collaboratively create a digital story (University of South Florida, 2018). The impact the project had on the participants' grades suggests that, in addition to whatever intrinsic motivation the doctoral students may have had (e.g., interest in technology or digital storytelling), there may have also been some extrinsic

motivation (Dörnyei, 1994) to create digital stories of good quality. The course instructor allowed the doctoral students to form their own groups and suggested they include four members. The participants ended up creating two groups of four members and two groups of five; however, as noted above, Participant 17 participated in two groups (Groups 2 and 3). Each of the four groups completed one digital story, making a total of four digital stories.

The reason I decided to collect copies of the participants' digital stories was to develop a deeper understanding of their beliefs regarding educational technology. The digital stories' multiple modalities afforded (van Lier, 2000) the doctoral students opportunities to express meanings that may have been difficult to convey with only one semiotic system (Yang, 2012). Therefore, exploration of the doctoral students' digital stories enabled me to develop a deeper understanding (Ng & Nicholas, 2015) and richer description of their ET-related beliefs than analysis of monomodal data (e.g., written text) alone could have. Another interesting aspect of the digital storytelling data is that the participants created the digital stories collaboratively in groups, unlike the other data, which they produced as individuals in interactions with other students (replying to classmates in the discussion threads), the instructor (responding to the instructor's discussion thread prompts), or this dissertation's author (i.e., responding to my questions in the survey or semi-structured interviews). With the data sets other than the digital stories involved interaction and dialogue, the participants expressed their voices as individuals.

The instructor's directions and the guidelines for the digital storytelling project indicated the groups should create a digital story, eight to ten minutes in length, that promoted a type of educational technology of their choosing. The course instructor provided the following detailed instructions for the doctoral students in the syllabus (University of South Florida, 2018):

The goal of this 4-member group-based project is to compile a 10-minute maximum tech-infused digital video story on the impact CALL/MALL technologies can have on SL/FL teaching and learning. The impact of tech materials should be described in a narrative storytelling style and may employ any and all selection of print/digital materials, including audio/video recordings, graphics, photographs, texts, and/or pictures. Think of your story as a targeted academic commercial to be used with clear intent in teacher professional development events. (p. 6)

I took care to protect the participants' identities while writing the findings of this dissertation. While the university's Institutional Review Board granted me permission to collect copies of the digital stories, in this dissertation I did not place any images from them that might identify who the participants were.

Digital survey. I invited all the students in the course, along with the course observer (Participant 17), to participate in the digital survey, and 14 of them completed it (see Appendix D for a list of the survey questions). To facilitate the surveys, I employed Google Forms, which collects and compiles the results of user-created surveys (<https://www.google.com/forms/about/>). Because it was an online digital survey, the participants had freedom to complete the survey at a time and location of their choosing. The first 25 questions on the digital survey were open ended. However, in order to avoid causing the participants possible fatigue from answering too many open-ended questions, I opted to make the final nine items (#25–33) Likert-scale instead of open ended. For these items, the participants only had to choose from a list of answers (see Table 16). The purpose of the survey questions was to collect demographic information and data on the participants' linguistic backgrounds, experiences with educational technology, and beliefs about educational technology. After the participants finished the surveys, I obtained their responses by

downloading them from the Google Forms file into an Excel spreadsheet. Data I obtained from the survey also provided me with ideas about how to conduct the semi-structured interviews.

Semi-structured interviews. I conducted semi-structured interviews with seven participants to triangulate the data and to obtain relatively deeper insight into their experiences and beliefs than the other data sets (digital surveys, digital stories, asynchronous online discussion threads) alone might have provided (see Appendix E for a list of the semi-structured interview questions). In order to make sure that I obtained data related to all four of the digital stories and the participants' experiences with them, and in consultation with my dissertation committee members, I decided to conduct the interviews with two randomly chosen members from each digital storytelling group. This would have resulted in a total of eight interviews. My dissertation committee chair and I rolled dice to randomly choose two members from each of the four groups. I contacted the eight randomly chosen participants to invite them to have interviews and all eight of them agreed. I conducted face-to-face interviews with six of the participants in the Spring of 2019, at times and locations of their choosing. However, one of the participants was out of state so we conducted the interview with a synchronous online conferencing tool. In addition, I failed to arrange a meeting with a participant who was busy and preferred to delay the interview. After a delay of several months, I decided to move forward without interviewing her. I recorded the seven interviews with two devices, an iPhone and iPad, to improve the probability of obtaining a high-quality audio file that would be easy to transcribe. Table 10 is a list of the seven participants who participated in the semi-structured interviews.

Table 10

Semi-Structured Interview Participants

Participant	Gender	Country of Origin	Year in Doctoral Program	First Language(s)	Other Languages & Self-Assessed Proficiency Levels
2	F	Saudi Arabia	3rd	Arabic	English-Advanced
4	F	Venezuela	1st	Spanish	English
7	F	Indonesia	2nd	Indonesian	English (advanced), Tagalog (beginner)
8	F	Turkey	2nd	Turkish	English (highly advanced), French (intermediate)
11	F	Kuwait	--	Arabic	English (intermediate)
13	F	USA	3rd	English & Spanish	Spanish - Native
14	F	Saudi Arabia	3rd	Arabic	English/ Advanced

Note. Participant 11 did not complete the survey and I failed to ask her year in the doctoral program in the semi-structured interview.

I made audio recordings of all seven semi-structured interviews, which took between 30 and 60 minutes each. The semi-structured interviews consisted of questions regarding the participants' backgrounds, their ET-related experiences and beliefs, and their experiences with their digital storytelling project (see Table 11). These interviews were semi-structured because, in addition to asking "the same questions, in the same order" (Patton, 2015, p. 667), I also asked follow-up and probing questions to achieve even richer data (Durdella, 2019; Patton, 2015). The questions I employed were mostly open-ended to encourage the participants to share their ideas freely. According to Frey (2004), open-ended questions enable participants to answer, "in their own terms or in a manner that reflects the respondents' own perceptions rather than those of the researcher" (p. 767).

Table 11

Semi-Structured Interview Questions

1. Demographic questions: Please tell me about yourself.
 - a. Where are you from?
 - b. What is your first language?
 - c. What languages can you speak, read, or write?
 - d. What's your level of proficiency with these languages?
2. Please tell me about your perceptions and knowledge of educational technology before you took this class.
3. Did your perceptions of educational technology change as a result of taking this class? If so, how did they change?
4. Before you took this class, please tell me about any experiences you had using educational technology as a student or teacher.
5. Before you took this class, please tell me about any experiences you may have had creating digital stories.
6. What was your digital story about?
7. Please tell me about your experience making a digital story in this class.
8. Did your experience creating a digital story, if at all, influence your opinions regarding the use of technology in second/foreign language education?
9. Before you took this class, please tell me about any experiences you may have had creating or editing videos.
10. What kind of educational technology did you learn about in this class? What do you think about it? Do you plan to use it in the future?
11. Did you feel confident about using educational technology before taking this course? What were you confident about? What were you not confident about?
12. How do you think you may use educational technology in your teaching or language study in the future?

Dissertation journal. In addition to the four primary data sources (asynchronous online discussion threads, digital survey, digital stories, semi-structured interviews), I also kept a dissertation journal in a Microsoft Word document in which I made multiple entries each week (see Appendix F for a sample of journal entries). On multiple days, before or after starting to work on this dissertation, I wrote entries describing what I planned to do or had done on that particular day. Furthermore, if a question arose or I had an idea I wanted to pursue further, I would make a record of it in this journal. One reason I kept this journal is that I believed it could be particularly useful when describing the data collection and exploration methods I discuss in Chapter 3.

Exploring the Data

In this section I discuss the qualitative research methods I employed to explore the data. The data analysis methods I employed were consistent with content analysis (Patton, 2002, 2015) because the data I explored consisted primarily of monomodal or multimodal texts: transcripts of interview transcripts and digital stories, copies of discussion threads, and printouts of survey responses. Classroom observations were not among the data I collected. According to Patton (2015),

content analysis usually refers to analyzing text (interview transcripts, diaries, or documents) rather than observation-based field notes. Even more generally, content analysis refers to any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings.

Case studies, for example, can be content analyzed. (p. 541)

However, the particular content analysis methods I employed to explore the data (Patton, 2002, 2015) were Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013; Strauss & Corbin, 1998) and deductive analysis involving multimodal discourse analysis concepts, primarily Unsworth's (2006) work on image-text relations. I discuss these processes in more detail in the following sections of Chapter 3.

Data transcription. In this dissertation I transcribed two of the primary data sets, the digital stories the participants collaboratively created and the semi-structured interviews I conducted with seven randomly chosen participants. In the following sections I describe these transcription processes, which were the first phases of data exploration.

Transcription of semi-structured interviews. The first data I transcribed were the semi-structured interviews. To transcribe them, I played the audio recordings of the interviews with a

transcription software application called Express Scribe and typed the dialogue in a Microsoft Word document word for word. I frequently replayed sections of the audio recordings to ensure my transcriptions were accurate.

Transcription of multimodal data. To transcribe the digital stories, I drew upon recommendations by Bezemer and Mavers (2011) regarding the need to consider and express the following: the purpose of the original videos, my reasons for conducting the research, the focus of the transcriptions, and what I choose to make salient in the transcriptions. The participants' main goal in creating their digital stories was to promote types of educational technology of their choosing. My purpose in analyzing their digital stories was similar in that I wished to explore their beliefs regarding educational technology. The focus of my transcription process and what I made salient in the transcriptions related to obtaining data that provide insight into the participants' ET-related beliefs and experiences.

Transcribing typically involves the *transduction* of one modality to another, such as representing oral language with written language (Bezemer & Mavers, 2011; Kress, 2003). To perform a multimodal transcription of the participants' digital stories, I created a tabular transcription template (Bezemer & Mavers, 2011) in an Microsoft Word file that I based on one Mavers (2009) employed in a study (see Figure 1). In the following paragraphs I describe how I employed this template, and the Word document containing multiple copies of it, to transcribe the various modalities (spoken language, written language, images, background music) that appeared in the participants' digital stories.

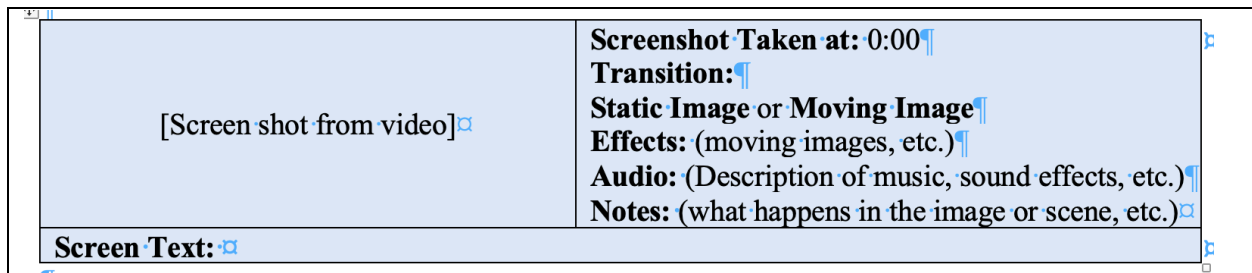


Figure 1. Digital story transcription template. Adapted from “Student text-making as semiotic work” by D. Mavericks, 2009, *Journal of Early Childhood Literacy*, 9(2), p. 146. Copyright 2009 by *Journal of Early Childhood Literacy*.

Although it was admittedly a subjective decision on my part, I filled out a new blank template box (Figure 1) whenever I believed the scenery in the digital story had changed in a significant manner. For example, if the items, screen text, or people appearing in the digital story changed in a manner that could suggest new or different meanings, I started a new transcription template. In each transcription template, I placed a screen shot from the digital story. Figure 2 is an example from the transcription of Group 4’s digital story. For sections of digital stories employing dynamic images (i.e., video), I took screen shots at points in the scenes that I believed to represent those portions of the videos, which is also an admittedly subjective decision (Bezemer & Mavericks, 2011).

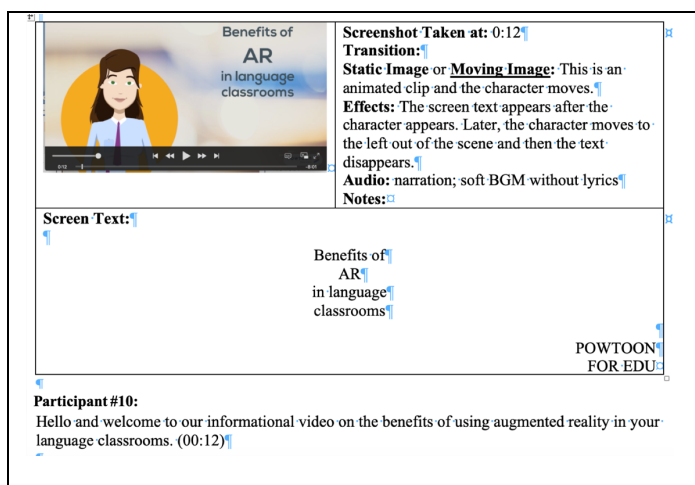


Figure 2. Digital Story Transcription Example. Template adapted from “Student text-making as semiotic work” by D. Mavericks, 2009, *Journal of Early Childhood Literacy*, 9(2), p. 146. Copyright 2009 by *Journal of Early Childhood Literacy*.

Then, I added notes about the following, if they applied: the time the scene first appeared, transitions (e.g., fade, dissolve, wipe), whether the scene involved static or moving images, special effects, audio (e.g., background music, sound effects), and anything else prominent or seemingly absent in the scene. I also typed in whatever screen text appeared in the scene in a box below the screen capture. Finally, below each of the templates, I typed in the video’s narration or dialogue word for word. I also included time stamps in these transcriptions to make it easier to find the scenes and dialogue in the video files. The beginning of each of the four digital storytelling transcripts also included an explanation of the abbreviations I employed and some details regarding how I transcribed the videos. Figure 3 is an example of one of the explanations. The participants’ names are covered to protect their privacy.

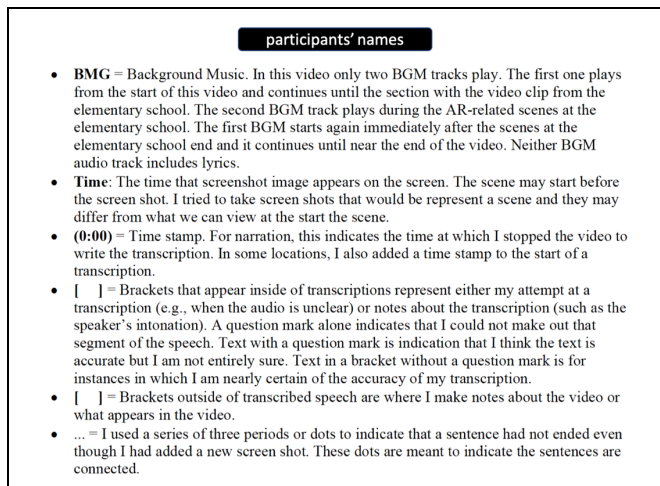


Figure 3. Example of Explanation of Transcription Abbreviations and Contents. I created this one, and three more similar to it, at the beginning of each of the digital story transcriptions.

Coding the data. The next stage of data exploration involved employing Constant Comparative Methods from Grounded Theory (Corbin & Strauss, 2008; Fram, 2013; Strauss & Corbin, 1998) to explore the interview and digital story transcripts, the discussion thread posts, and the open-ended survey responses. Fram (2013), who described how researchers can employ Constant Comparative Methods outside of Grounded Theory, promoted Constant Comparative

Methods as a means of taking an emic perspective in data exploration, which is suitable for this dissertation because I seek to explore the participants' experiences and beliefs. Fram (2013) described Constant Comparative Methods as “an iterative and inductive process of reducing data through constant recoding (Glaser & Strauss, 1967)” (p. 3). As the amount of data I collected seemed rather large and daunting (e.g., 178 pages of discussion thread data), I decided to employ MaxQDA, a brand of commercially available data analysis software, to employ the Constant Comparative Methods. MaxQDA enabled me to coordinate coding across multiple data sets. For example, I could search all four data sets at the same time and apply the same codes in each of the sets.

I coded the online asynchronous discussion threads first because they appeared to be one of the largest data sets, 15 of the 17 participants had contributed to them, and they were the focus of Research Question 1. I believed this data set would help familiarize me with the participants and course contents before turning to the other sets. I coded the semi-structured interviews next because I believed they would similarly provide me with a relatively deeper understanding of some of the participants' ET-related knowledge, experiences, and beliefs. Following this, I turned to the digital survey responses because I believed that after coding the previous two data sets it would be easier to code the smallest of the four data sets, whose answers happened to be already tabulated in an Excel spreadsheet file. I coded the digital stories last because I believed that the multimodal analysis I employed would make this the most challenging data set to explore.

In the initial stages of each of the four iterations of the analysis process, I read over the data sets several times. Then, applying Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013), I began open coding, which Strauss and Corbin (1998) describe as “[t]he analytic

process through which concepts are identified and their properties and dimensions are discovered in data” (p. 101). During this stage, I carefully read through the data again, I developed codes for each section of the transcripts. In addition, I highlighted or made note of (1) sections that I thought would help answer the *a priori* questions and (2) other sections of interest related to the purposes of this dissertation. During this initial stage of coding I tried to keep an open mind about the data and “all potentials and possibilities contained within them” (Corbin & Strauss, 2008, p. 160). The process was very laborious, and, in total, I created and applied various codes to the data at least 6,106 times. In subsequent readings of the sets of data, I engaged in axial coding, which involved trying to find taxonomic relationships among the codes I had identified earlier during open coding (Corbin & Strauss, 2008). For the third phase of coding, I selected axial codes that addressed the research questions and axial codes related to other topics of interest, and then attempted to relate them to other groupings of codes in order to develop findings from the data (Corbin & Strauss, 2008).

During the axial and selective coding stages of the process, I employed MaxQDA’s “MaxMaps” functions to visualize the codes and look for connections and relationships among them. The MaxMAP tool allowed me to visually link codes together with lines and arrows, and I used this function to identify taxonomic relations among them (e.g., placing codes within larger, subsuming categories of codes). From these groups of codes, I developed themes that I used to answer the research questions. Figure 4 is an example of one of the many code maps I created with MaxQDA.

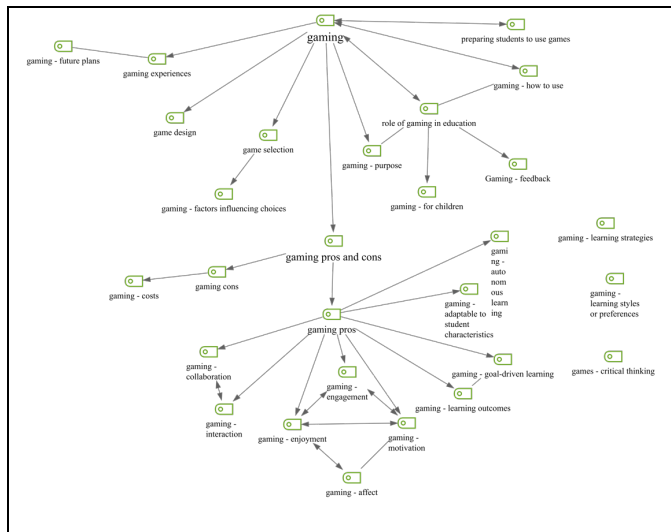


Figure 4. Example of code map created with MaxQDA. This code map is for codes related to gaming in L2 education.

Verisimilitude

Judging from the following description by Denzin and Lincoln (2005b), my beliefs regarding the nature of truth, reality, and meanings are consistent with those who hold constructivist beliefs:

“The constructivist paradigm assumes a relativist ontology (there are relative multiple realities), a subjectivist epistemology (knower and respondent cocreate understandings)” (p. 24). I also agree with Post-Structuralist feminist tenets regarding the “inability ever to represent the world of lived experience fully” (Denzin & Lincoln, 2005b, p. 24). Therefore, in my dissertation I recognize that my epistemological and ontological beliefs are likely to influence my interpretations of the data and representations of the discoveries (Denzin & Lincoln, 2005b). In this regard, I make no claim that the discoveries represent an objective truth.

Summary

I conducted this dissertation with doctoral students in a technology-in-education and second language acquisition program at a large public research university in the Southeast of the United States. The seventeen participants I recruited were from eleven different countries around the world who can communicate in various languages. This dissertation took the form of an

explorative descriptive case study (Saldaña, 2011; Yin, 2014) in order to develop a rich description of the participants' beliefs regarding educational technology and to develop methods for exploring those. The primary data were discussion thread posts, copies of digital stories the participants collaboratively created, and their answers to surveys and semi-structured interviews. I employed Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013; Strauss & Corbin, 1998) to search for ET-related themes in the data. Additionally, I explored the participants' digital stories by employing multimodal concepts (Kress & van Leeuwen, 2006; Serafini, 2014), particularly Unsworth's (2006) intersemiotic theories on image-text relations, which are informed by Systemic Functional Linguistics (Halliday & Matthiessen, 2014).

CHAPTER 4: DISCOVERIES AND DISCUSSIONS

Introduction

In Chapter 4, I describe the discoveries of this dissertation, which are based upon the four primary data sets (asynchronous online discussion threads, digital storytelling project, semi-structured interviews, digital survey). The four *a priori* questions that guided this dissertation serve as the organizational basis for this chapter. They are

- (1) What are the educational technology-related themes embedded in the doctoral students' discussion threads?
- (2) What are the educational technology-related themes embedded in the doctoral students' digital stories?
- (3) In what ways do the doctoral students experience a digital storytelling project? and
- (4) How do the doctoral students perceive the use of educational technology in second/foreign language education?

In the following sections of Chapter 4, I delineate the discoveries for each of the *a priori* research questions, offer discussions for each question, and then conclude with a summary of topics covered herewithin.

Research Question 1: ET-Related Themes in Discussion Threads

In this section of Chapter 4, I discuss the major themes I identified in the asynchronous discussion threads in which the doctoral students participated as part of their coursework. To illustrate these themes and let the participants speak in their own words, I provide multiple

representative examples of their posts. The discussion threads consist of asynchronous, written dialogue among the participating doctoral students, which makes this data set different from the digital stories and digital survey responses, which were more monologic in nature.

Before discussing the themes I identified, I believe it is important to point out that the course instructor’s provision of topics and prompts to guide each of the course’s weekly discussions may have influenced the topics or themes that emerged in the six asynchronous discussion threads. Furthermore, the weekly discussion threads were graded assignments for the participants so they could have also been extrinsically motivated (Dörnyei, 1994) to focus on the themes the course instructor assigned. Table 12 lists the topics the course instructor assigned for each week’s discussion. The topics in quotation marks represent the exact language the course instructor employed in the course LMS to introduce and provide directions for that particular week’s assignment.

Table 12

Online Asynchronous Discussion Topics by Week

Week 1	“Online Introductions”
Week 2	“New Media Technologies and Tomorrow’s Digital Literacies Today”
Week 3	“Emerging Technologies & Cultural Considerations”
Week 4	[This week’s discussion did not have a title.]
Week 5	“Application of CALL and Digital Environments”
Week 6	“FINAL Course Wrap Up Discussion”

Employing Constant Comparative Methods (Corbin & Strauss, 2008) to inductively explore the data, as described in Chapter 3, I was able to identify five overarching themes in the online asynchronous discussion threads. These five themes, which I will discuss individually in the following sections, are

1. characteristics of ET in general and specific types of ET;
2. ET-related skills and knowledge;

3. L2 learners and educational technology;
4. employing ET to learn L2; and
5. the participants' doctoral course.

Theme 1: Beliefs about ET in general and specific types of ET.

The participants expressed their beliefs regarding ET throughout the discussion threads.

However, I was able to organize these beliefs into two sub-themes:

- beliefs regarding ET in general, and
- beliefs regarding specific types of ET.

In the following paragraphs, I address these two sub-themes individually and provide representative examples of them from the participants' discussion posts.

Beliefs regarding ET in general. Throughout the discussion threads the participants expressed their beliefs regarding ET in general. In particular, they discussed the importance of technology and ET, the continual evolution of ET and its effects, and the *pros* and *cons* of ET in general. In the following paragraphs I address each of these categories of beliefs.

The importance of technology and ET. Many of the participants' posts involved expressions of their beliefs that technology and educational technology play, or have the potential to play, important roles in society in general, and education and language education in particular. For example, Participant 15 noted that “[a]s we are now living in an increasingly novel and eye-capturing world, technology has greatly imbedded in our lives. I can hardly image [*sic*] how my life could be without the use of technology.” Participant 4, sharing her view, stated “[i]t is living in our life 24/7, and we need to define how our teaching-learning process will be.” Participant 2 described ET's role in education in general thus: “I think in our field, technology plays a crucial role in teaching and learning especially for the new generations.” Participant 16

echoed that belief, stating “Nowadays, it is almost impossible to teach without technology in the classroom.” Summing up the impact of ET on education, Participant 5 noted that

The development of digital technology has transformed collaborative learning for the better, provided unprecedented access to learning resources, and improved learning experience as a whole. With the right usage and application of digital technology, more learners can be better served and thus improving [*sic*] the society.

As these examples illustrate, many of the participants expressed beliefs that technology plays an important role in modern life in general and in education and language education in particular. This theme appeared multiple times in the discussion threads.

The continual evolution of ET and its effects. Another major sub-theme present in the discussion threads was related to multiple participants’ perception that educational technology undergoes continual and rapid change and evolution. In particular, they discussed the rapidly changing world and its implications, adapting to ET-related changes, and beliefs that some aspects of L2 remain consistent.

Discussions related to perceptions of the world’s rapid changes included expressions of beliefs regarding both technology in general and educational technology in particular. Multiple participants indicated they believed technology and educational technology, and the world as it relates to them, to be undergoing rapid change that is inevitable. Or, as Participant 14 put it, “I don't think that this transition will stop one day.” Participant 11 noted the impact technological changes have had on society: “everything has changed recently and especially technology and ... [the] internet has become a very important thing in our lives and it has a huge impact.”

Participant 15 expressed similar views: “The fast-paced technological advancement has now brought many new changes in ordinary people’s lives. People’s life styles are changing which

means the traditional teaching and learning methods also need to be transformed to keep abreast with the times.” She further noted that “[t]he advancement in technologies has the potential to turn the classroom into an active one.” In addition to commenting on the changing world and the impact of technology and educational technology on it, some participants also indicated that the types of technology had increased in variety and number. For example, Participant 15 employed the word “ocean” as a metaphor to describe its abundance.

While many discussions focused on the nature and impact of change and technological change, multiple participants, as exemplified by Participant 15’s quote in the paragraph above, also stressed the need for educators and other stakeholders to stay abreast of changes and/or adapt to them. For example, at least six participants (Participants 3, 10, 12, 13, 15, 16) employed the term “keep up” in discussions of the need to adapt to technological evolution. Another more specific example comes from Participant 9, who, in a discussion of *Reimagining the Role of Technology in Higher Education* (US Department of Education, E. O. of E. T., 2017), remarked that its “[c]hapter two outlines how educators need to be supported to adapt to changing technology.” As these examples illustrate, multiple participants perceived there is a need for educators to possess knowledge of current technology trends and to keep up with future developments.

Other topics related to the evolution of technology included changes in beliefs about educational technology and changes in teaching approaches. For example, Participant 1 noted that in order to train teachers to employ educational technology effectively, the teachers “need to believe first that these technologies will benefit students learning without making their job harder, and these technology [*sic*] are not going to divert teachers and students’ attention from instruction.” Another example comes from Participant 2, who noted that attitudes have changed

toward the use of gaming in education. As these examples illustrate, multiple participants believed that as technology continues to evolve, teachers' beliefs about employing educational technology need to adapt with the changes, and teachers' educational technology knowledge and skills need to improve.

In addition to discussing the evolving beliefs of others, some participants noted that their own beliefs regarding educational technology had altered, with their enrollment in their doctoral program and participation in the course being among the main reasons. Participant 3, for example, credited the course and her classmates with changing her beliefs: "I am realizing that I myself need to not let labels of new technological advances deter me from trying to examine how it can benefit my students." She also noted how her own perceptions of educational technology had evolved for the better and that she found herself more open to trying unfamiliar technologies for the sake of her students. Participant 10 shared similar experiences and perception shifts:

Truth be told, I looked into this program a couple of years ago and decided "technology" was not an interest of mine since I wanted a language-focused program for my doctoral studies and I continued looking elsewhere for programs. To me, technology was the new computer coming out or some newfangled software program which had no relevance to my life. Since joining the first class a year ago, I have realized just how wrong I was to make those assumptions and this class in particular has helped me to see the logic and even necessity of technology use in curriculum design for motivation, efficiency, effectiveness, and ease-of-access.

As these participants' posts illustrate, multiple participants indicated that their own beliefs regarding educational technology had evolved, particularly as a result of participating in this course and other courses in their doctoral program.

While many of the participants perceived that educational technology has undergone rapid change, some of them also noted that some aspects of education, such as desirable core beliefs or tenets of L2 teaching and learning, remain, or should remain, constant. Participant 15, for example, stated, “I think even though technology permeates society with increasing accessibility, especially with the latest advancement in VR, AR, and AI, the core of second language teaching and learning stays the same.” Participant 11 similarly noted that while technology has changed, educational contexts have not. Participant 4 indicated she felt nostalgic about the traditional education methods she experienced as a student, but also recognized that perhaps they had been “boring.” So while multiple participants acknowledged the impact of advances in technology, there was disagreement about whether every aspect of L2 teaching and learning had changed or should change.

Pros and cons of ET in general. Discussions of the participants’ perceptions regarding the characteristics of educational technology in general occupied a relatively large portion of the online asynchronous discussion threads. While the participants discussed many topics related to technology and educational technology, such as its perceived ubiquitous nature, I could organize these perceptions of the general characteristics of ET into two categories: *pros* and *cons*. In the following paragraphs I describe in detail what the participants considered to be the potentially positive and negative sides ET in general and offer examples of those beliefs.

Pros of educational technology. In the discussion threads I could identify three major strands related to perceptions of the *pros* of educational technology:

- ET’s potentially positive impact on learner motivation and engagement;
- ET’s potential to provide access to learning materials and enable learning activities, including those that are authentic, interactive, and/or collaborative in nature, and

- ET's perceived potential to positively impact learner outcomes.

However, since the potential role of educational technology in learning in general is one of the major themes I could identify in the discussion threads, I will discuss it only general terms here and go into more detail in the section dealing with the theme related to educational technology and L2 learning.

In the discussion threads, participants frequently commented on the potential of educational technology to facilitate learner motivation and engagement. Participant 7, for example, expressed multiple times her belief that educational technology could “motivate and engage my L2 learners,” which would positively impact learning outcomes and “learners’ independence.” Participant 16 also believed that “digital technology will increase learners' engagement and motivation and will change the language learning experience for our students.” Pointing out the existence of evidence supporting Participant 16’s assertion, Participant 14 stated “I have read many studies that prove the positive impact of using technology in languages learning classes.” Contributing to the discussion, Participant 10 indicated what she considered to be sources and means of student motivation:

Motivation is key in student engagement and nothing motivates them more than something new and exciting — taking their favorite past time and allowing (and encouraging!) the use in the classroom setting — this will likely contain digital components for today’s students.

However, some participants conversely noted that the use of technology alone was insufficient to promote motivation. Participant 2, for example, stressed that a deep understanding of students was essential in employing “the appropriate technology that motivates” them.

While nearly all of the participants' posts mentioning L2 learner motivation or engagement focused on educational technology's potentially positive role, Participant 14 cited study findings by Harris, Al-Bataineh, and Al-Bataineh (2016) to caution against assuming that it automatically promotes motivation. Participant 14 noted that the authors "found that technology does not cause an increase in student motivation." She went on to say, "[t]hese findings create some concerns to me. I think this topic requires more research and investigations."

The second major strand in the participants' beliefs regarding the *pros* of educational technology related to its perceived potential to provide L2 learners with access to learning materials (i.e., input), activities, and environments, including those that are relatively more authentic, interactive, and/or collaborative. For example, Participants 2, 4, and 16, among others, indicated that educational technology can offer learners access to authentic materials that contribute to learner engagement or motivation. Participant 2 stressed that authentic materials familiarize students with "the culture and functions of the language, not only the structure." She added "[t]echnology can be a great tool or resource for language learners to look for authentic materials such as movies, commercials, social media, etc." Discussions such as these, regarding authentic learning materials, appeared frequently in the discussions about educational technology.

Other participants pointed to the potential of educational technology, such as Virtual Reality or educational games, to create or provide access to authentic environments and learning experiences, which promote motivation and learning by engaging students in meaning-focused communication that is relatively more authentic in nature. For example, in her discussion of authentic learning experiences, Participant 8 cited the course instructor, whom she described as an advocate of employing authentic tasks and materials "whenever and wherever possible."

While multiple participants discussed how educational technology can provide access to authentic learning materials and experiences, Participant 12 noted that some technologies, AI and VR in particular, have the potential to improve the accessibility of education in general by making it “affordable for everyone around the world.” Participant 11 also believed education technology has the ability to address individual learners’ interaction and language production needs, stating “[t]echnology will assist people with practice of a subject and to experiment at their own pace and confidence level.” As these examples illustrate, many of the participants expressed beliefs that educational technology provides access to learning materials and enables learning experiences, including those characterized by authenticity, interaction, and affordability.

Participants 1, 2, 5, 7, 9, and 13, among others, expressed views that educational technology improves collaboration among students and/or educators. Participant 2, for example, indicated that, “unlike the traditional teaching methods,” CALL can afford opportunities to share knowledge, collaborate, and interact with people in both local and global contexts. Participant 16 cited collaborative learning with “virtual tools,” “authentic materials,” and “multisensory stimulation” as requirements for learner motivation. Participant 2 expressed a belief that technology could promote collaboration among both educators and students, but stressed the need for educators to receive training in how to employ it. Participant 13 similarly stressed the potential value of technology for educators, noting that it could promote *collaborative leadership* among them.

Some participants also noted that ET can improve or increase interaction among L2 learners, as well as expand the number of people with whom they interact, including those beyond classroom walls. Participant 2, for example, articulated this view thus: “using CALL in language classrooms provides learners with different opportunities to collaborate and participate

with each other either locally or globally.” Participant 9 concurred, stating educational technology “can expand the boundaries of a classroom.” In addition, Participant 2, discussing SLA research by Long (1985, 1996) on interaction and research on SLA and CALL by Chapelle (1998), suggested that “communication should be an integral part of learning the target language.” She also added that the interaction should be “two-way information instead of one-way information. Two-way information exchange is expected to have a significant impact on the L2 learners (Long, 1985).” These examples are illustrative of multiple participants’ beliefs that educational technology not only increases opportunities for communication, which improves acquisition of the target language, but that it can broaden the number and types of people with whom students interact.

The following statement by Participant 7 summarizes the views other participants expressed regarding education technology’s ability to provide access to authentic materials, and authentic and/or collaborative learning experiences: “Administrators and educators should integrate technological tools in education to promote interactive, engaging, and authentic language learning experience to help ELs achieve success in language learning.” However, Participant 5, who also acknowledged the “beneficial” nature of authentic materials, cautioned that situations may exist in which the presence of authentic materials alone may not be sufficient for academic language achievement. He noted that in some circumstances authentic materials may actually promote the inaccurate use of language, such as “double negative.” Furthermore, he pointed out that educational technology may also be an effective means to provide access to “pedagogically prepared materials,” as opposed to authentic materials, that can help improve learners’ academic language competence. However, the majority of the participants perceived value in the ability of educational technology to bring students into contact with authentic

materials and to enable them to engage in authentic, collaborative, and communicative learning activities.

A third major strand of the *pros* of educational technology related to the participants' perceptions of its potential to have a positive impact on learner outcomes. I would like to note that this is a topic I will address again in Research Questions 2 and 4, which focus on the findings from the digital story data and all four data sets, respectively. The findings I discuss here derive from only the discussion threads. Among the positive learner outcomes the participants discussed were general learner achievement, vocabulary learning, and the promotion of creativity.

Regarding learner outcomes in general, Participant 10 pointed out that “[s]tudent achievement can be enhanced through the use of adaptive technology and through the opportunity to increase digital literacy.” Participant 14 expressed similar views, noting she had seen many studies which provided evidence that ET improves L2 learning. Participant 11 credited what she considered non-educational technology, such as movies, with improving her English language competence. Multiple participants noted they felt educational technology could help with the learning and retention of target language vocabulary. For example, Participant 5 pointed out that the multimodal affordances of multimedia, including images, can promote understandings of vocabulary meaning and etymology, and improve memorization. Participant 9 wished that she herself had learned with current technology because she would have enjoyed the experience more and retained vocabulary more efficiently. On the topic of learner creativity, Participant 10 discussed an article by Kramersch et al. (2000) in which she noted the authors asserted that digital media promotes creativity more effectively than “print media.”

The cons and potential drawbacks of ET. While the majority of ET-related discussions involved identifying its *pros*, multiple participants also discussed what they considered to be potential *cons* or drawbacks of educational technology. I could identify four major strands of ET-related *cons*:

- concerns about lacking sound reasons or rationales for ET use,
- potentially prohibitive costs,
- the potential of ET to distract or detract from teaching or learning, and
- the existence of ET-related dangers or risks.

In the following paragraphs I summarize these four strands of *cons* and offer examples of the participants' posts that illustrate them.

The first strand of *cons* involved the participants' expressions of concerns about teachers implementing or using ET without sound reasons, or even overusing ET. For example, at least 13 participants (Participants 1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 14, 15, and 16) expressed beliefs that educational technology use should be purposeful. One example is an exchange between Participants 4 and 9, with former stating, "We can't use technology without purpose," and the latter concurring with "We shouldn't just implement technology for the sake of it." Many participants also cautioned against becoming "swept up" with the popularity of education technology, and some urged other educators not to view ET as a "panacea" for L2 education. Participant 15, for example, stated that

Technology, no matter how advanced it becomes, will always be the facilitative tool to aid teaching and learning; it is not the panacea, and should always be adapted appropriately with the instructions that are learner-centered, and address the varying needs of the diverse learners.

Participant 15 also stressed that the focus “should not be the learning of technology but rather the learning through technology.” Participant 9 agreed with her that educational technology use should be facilitative of goals instead of being a goal in and of itself. Participant 2 addressed similar concerns, stating “[s]ometimes educators get quite obsessed with using the latest technologies in their classroom without thinking of the actual contribution and output.” As these examples illustrate, warnings regarding the potential for educators to use educational technology without a purpose were common in the discussion threads.

The participants provided citations to support their concerns about educational technology use lacking educational purposes. For example, some of those participants (e.g., Participants 2, 4, 15, 16) indicated that the course instructor and one of his publications, which was a course reading, expressed similar concerns about using educational technology without a purpose. As Participant 2 put it, the course instructor stated, “there should be a purpose for the use of technology.” Participant 4 also cited the course instructor and a publication of his, *Understanding Idiomaticity in CALL* (Liontas, 2018b), while agreeing that technology use should be purposeful. The participants frequently addressed concerns that interest in and enthusiasm about educational technology alone may lead teachers to employ it in L2 education without having a proper educational purpose.

The second strand of ET *cons* related to the participants’ perceptions that educational technology use could be prohibitively expensive. For example, Participant 5 noted the potential financial burdens ET employment may cause: “constant technological improvement in hardware performance and software requirements means devices have to be changed every now and then just to keep up, malfunctions notwithstanding, bringing in concerns about the affordability of the technology in education.” Participant 3 shared similar beliefs, stating “[i]t is true technology has

its benefits, but we shouldn't disregard their costs." Participant 16 expressed similar concerns that the costs of educational technology may be beyond schools' budgets.

The third strand of ET *cons* involved expressions of the participants' concerns about the potential for educational technology to distract or interfere with L2 education. Participant 1, for example, stated, "teachers need to believe first that these technologies will benefit students learning without making their job harder, and these technology [sic] are not going to divert teachers and students' attention from instruction." Participant 16 also cautioned that purposeless use of technology could lead it to becoming "a distraction." Participant 11 warned that technology has the potential to become "a crutch," enabling students to avoid speaking in class, which could negatively impact their oral communication skills. Participant 16 also worried that the brief nature of digital multimodal communication may lead to a situation in which it may become challenging "for teachers to persuade students to write essays and other academic papers in which they need to express their ideas in a more sophisticated use of the language." As these examples illustrate, multiple participants expressed concerns that educational technology may actually interfere with learning in some situations.

The fourth strand of the potential *cons* of educational technology involved the participants' expressions of concerns that educational technology use could result in problems for L2 learners' safety, privacy, confidentiality, and/or behavior. Participant 1, for example, indicated that protecting learners' privacy could be a concern: "sometimes offering new technology where students can share personal information, images, and their personal contacts will have bad consequences." Participant 8 expressed similar beliefs: "ensuring the safety of our students is a must when we design CALL." In order to protect students' safety, Participant 5 stressed that he and his fellow educators need to understand their own technology-related

abilities when choosing which educational technology to employ with students. Participant 2, who agreed that protecting students' safety was paramount, also expressed concern about harm educational technology may cause others. She also stressed it is the duty of educators to teach students "how to behave ... online." As these examples demonstrate, risks to student safety were among the chief concerns the participants expressed about educational technology.

As the contents of these strands indicate, while the participants generally had favorable impressions regarding the potential of educational technology to have a positive impact on L2 teaching and learning, they also recognized that purposeless, inefficient, or ill-advised (e.g., putting learners' privacy or safety at risk) use of educational technology may detract from L2 education. In the following section of the findings, I turn to the participants' perceptions of individual types of educational technology, including both their *pros* and *cons*.

Beliefs regarding specific types of ET. While the previous section focused on the participants' perceptions of ET in general, in this section I address their beliefs about the characteristics of specific types of ET. The technologies they primarily focused upon were

- artificial intelligence (AI),
- (digital) annotations and glosses,
- immersive technologies (AR, VR),
- assessment and computer-assisted-testing (CAT), and
- educational games.

Because the participants expressed different beliefs about each educational technology, I address them individually in the following paragraphs.

AI. AI was one of the technologies the participants discussed most frequently in their discussion thread posts. However, one of the reasons for its ubiquitousness may have been that

the instructor asked them the following question about AI as part of the prompt for Week 3 discussions: “Should advances in AI be welcomed or curtailed in our FL and SL curricula?” The majority of the AI-related discussions focused on the *pros* or benefits of using AI; however, some students also discussed types of AI, robots, and experiences employing AI.

The potential value AI has for pedagogy was a common theme in the discussion threads, and many of the participants also noted their personal interest in AI. Participant 13, for example, stated, “As we experience Web 2.0 technologies, it is time to move on, into the 21st century of Web 3.0 artificial intelligences (AI) and beyond.” Many participants also expressed their belief that AI has a potentially positive role to play in L2 education. Participant 7, for example, stated her belief that “AI in a second/foreign language learning could also be fun and engaging.” Participant 15 indicated she believed “AI could offer great help in language teaching and learning.” Participant 8 envisioned AI a good means for teachers and learners to receive immediate feedback on learners’ output. Participant 10 indicated she saw potential in AI for “engaging students in a digital classroom.” While multiple participants expressed their positive perceptions of AI use in L2 education, Participant 3 noted that she initially had grave concerns regarding it, but her perceptions improved as a result of what she had learned in the course:

I think my view of AI was skewed after watching all those movies that make AI as scary life alternatives. It was [Participant 7’s] response to my post that really resonated with me with this topic and how AI is affecting her and her families [*sic*] lives in a good way.

Other AI-related discussion thread posts included Participant 14 delineating the differences between types of narrow and general AI, and Participant 7 mentioning experiences with employing AI in her personal life.

Annotations and glosses. (Digital) annotation and glosses were another type of educational technology the participants discussed in the discussion threads. However, I would note that a Week 2 course reading assignment focusing on annotation (Liontas, 2001b) may have influenced the presence of posts on this topic. Multiple participants' discussions focused on how the presence of digital multimedia annotations, with users having the option to choose from among different types of annotation (e.g., multimodal, written text), can improve L2 learner outcomes. For example, Participant 1 commented that "[u]sing multimedia annotations ... definitely will not only build on student's previous knowledge in their L1, but also will meet with different learning styles." Participant 2 expressed her belief that multimedia hypertext (a type of annotation) can improve "reading comprehension" by providing "global opportunities to deal with the text." In addition to the target language, Participant 10 noted multimedia annotations can help learners, including herself, learn the target culture more effectively than the types of written annotations that appeared in textbooks when she was a student.

Other types of technology the participants frequently discussed in the discussion threads were immersive technologies, particularly Augmented Reality (AR) and Virtual Reality (VR). I address these technologies together in the findings because the participants frequently referred to both of them within a single post, or even within a single sentence. The participants covered various topics related to AR and VR, the majority of which I could group into the following strands: motivation and engagement; responsiveness to individual students; the creation of immersive and authentic environments; academic achievement; and personal interest in researching or employing these technologies.

Multiple participants indicated they thought both AR and VR were fun ways to learn languages that can motivate and engage students. Participant 9, for example, noted its potential

in this regard across the disciplines: “I think students in all subjects would be really fascinated and interested if AR is implemented into the curriculum effectively.” Participant 14 discussed motivation as a rationale for using AR and cited multiple studies “testing its validity (Chen et al., 2015; Jamali et al., 2015; Salmi et al., 2012; Solak & Cakır, 2015).” Participant 9 succinctly described AR as “fun,” and Participant 12 similarly described both AR and VR as “very interesting.” As these examples attest, perceptions that AR and VR could positively impact learner motivation and engagement were common in the discussion threads.

The participants also noted that AR and VR could be responsive to the needs or wants of individual learners, who vary in terms of personalities, learning styles, or learning preferences. For example, Participant 14 expressed these views about AR’s responsiveness to individual students’ learning styles. Participant 11 also commented on how these technologies may help students low in confidence: “With the use of this methods such as VR for example people will feel less pressure or fear to participate in class, to try to speak and to ask.” Furthermore, while multiple participants discussed the responsiveness of AR and VR to individual student needs, Participant 1 pointed out the convenience of VR in that it affords students the freedom to study when and where they like.

The participants also noted that VR can enable immersive learning experiences and that AR and VR can provide access to authentic learning materials and authentic learning experiences. Participant 15, for example, expressed her belief that VR, along with AI, can provide foreign language learners, who otherwise do not have direct access to the target culture, with authentic contexts in which to learn. Participant 12 pointed out that another input-related *pro* of AR is that it allows learners to “repeat the educational video as many times as they want!” This also reduces paper consumption, she added. Participant 2, whose views were similarly

enthusiastic, pointed to the ability of VR to provide immersive learning experiences that involve less language anxiety:

VR games provide an immersive setting for students to learn the SL/FL. In such setting learners are exposed to natural and incidental learning where they can communicate in a less intimidating setting. VR provides a safe environment for students to make errors and take risks without worrying about their grades.

Other participants voiced their own personal interest in researching or employing these technologies in L2 education. For example, Participants 2 and 9 explicitly stated their interests in both AR and VR, and Participant 14 implicitly expressed an interest in AR by providing a detailed overview of AR, which included its history, and by citing research both supportive and unsupportive of its ability to promote learner motivation. As the above examples illustrate, multiple participants held positive perceptions of AR and VR, and some of them indicated they wanted to employ or research AR and/or VR in the future.

Posts about Computer-Adaptive Testing (CAT) also occupied a relatively large portion of the participants' online discussions. The primary strands of this sub-theme were its *pros* and *cons*, test design, and requirements for employing CAT effectively. I discuss each of these strands in the following paragraphs. The participants also discussed a course reading on CAT by Dunkel (1999). However, there is a need to note that the CAT-related discoveries for Research Question 1 are similar to the CAT-related findings for Research Question 4. While Research Questions 1 and 4 involve different data sets (the discussion thread for the former and this dissertation's entire data for the latter), the great majority of the data on CAT comes from only the discussion threads.

The participants pointed out multiple potential *pros* of CAT. Participant 3, for example, expressed a general evaluation that “[u]sing reliable and valid CAT in assessing students could be convenient and effective.” However, she also cited a more specific *pro*, that today’s learners may prefer to face one question at a time on tests, as they would with CAT, rather than have their attention divided among a number of test items as they would with a paper test. Participant 8 noted another advantage for test-takers is that CAT “can be adjusted to the test-takers’ proficiency level and pace.” She, along with Participant 7, also stated that another *pro* of CAT is its ability to provide immediate feedback. Flexibility and responsiveness to learners were other *pros*, according to Participants 8 and 13.

While the participants discussed the *pros* of CAT, they also described what they considered to be its *cons*. Among the perceived potential *cons* of CAT were test anxiety, technical issues, and other CAT-related challenges. Participant 7, as an example, shared an experience in which some of her ESL students became anxious about CAT “and refused to use it,” so she switched to paper-based exams. Participant 5 agreed that anxiety about technology could cause test-takers to dislike CAT, and added that having a clock in the interface (e.g., computer screen) could cause them to worry about time.

The participants also addressed potential technology issues. One, Participant 8, urged that CAT interface should not make it difficult for students to take their exams. Another, Participant 12, noted that with CAT there is the possibility the exam may suddenly terminate or fail to record the students’ true scores. Yet another, Participant 7, shared an experience at her school in which students did not have the requisite digital literacy skills so the school administrators had to rush to prepare them to take CAT.

The participants also addressed multiple other categories of CAT-related concerns. For example, Participant 3 believed that since CAT presents one question at a time, it does not promote students' writing skills as much as paper-based tests would. Another example came from Participant 8, who cautioned against over-enthusiastically relying on CAT scores which may lead educators to “disregard the global qualities of assessment.”

Other types of technology upon which the participants focused much of their attention were educational games or gamification. These topics appeared frequently and occupied a relatively large portion of the discussion threads. The term *gamification* refers to employing game-types of elements in technologies or activities that are not, strictly speaking, games (Dehghanzadeh et al., 2019). The following are the major strands related to gaming (i.e., the use of games or gamification) that the participants discussed: personal experiences with games or plans to be involved with them in the future; the *pros* and *cons* of games; reasons for choosing games; L2 learners, learner characteristics, and games; and the impact of game use in L2 education.

Game-related experiences, lack of experiences, and plans to be involved with games in the future were topic strands that appeared frequently in the discussion threads. The participants varied in their experiences learning languages with games, with some (e.g., Participants 5, 11, 12, 16) indicating they had some or extensive experience, and others (e.g., Participants 3, 4, 10, 13) indicating they had little. The participants also appeared to vary in the amount of their experience employing games in their teaching. Participant 7, for example, described in detail her extensive use of educational games as a teacher, but other participants did not convey details about employing games as teachers. However, multiple participants, including Participants 3, 5, 12, and 13, among others, indicated a desire to employ educational games in their future

teaching. In addition, Participant 13 enthusiastically indicated a desire to conduct research on games and design them in the future.

The participants also discussed their beliefs regarding the positive outcomes of game use in L2 education and generally promoted their use in L2 teaching and learning. Discussions of the perceived *pros* of gaming occupied much more of the participants' discussions than its *cons*. Multiple participants believed gaming has a positive impact on the following: affective factors (e.g., anxiety), motivation, and engagement; interaction and collaboration among learners; and learning outcomes (e.g., L2 acquisition, cognitive development). I address each of these perceived benefits of gaming in the following paragraphs.

One of the major foci of the participants' discussions was the positive effect they believed gaming could have on learner affect (e.g., anxiety, confidence, enjoyment), motivation, and engagement. For example, Participant 12, in a reply to another participant's comment, stated that "I agree with you that games lower anxiety and stress in the language classroom!" Regarding confidence, Participant 12 noted that she had "witnessed ESL students who lack confidence in their speaking skills talk freely when playing games as their main goal at that moment is to win not to speak in perfect grammar!"

Multiple participants additionally pointed out the ability of games to create enjoyment, motivation, and engagement as being key to their value in L2 education. For example, Participant 16 stated, "[s]tudents will engage and motivate a lot easier if the usage of technology and games are part of the tools used in class." To these discussions, Participant 14 added, "[g]ames could play the role of the motivating tool for digital native generations." Participant 2 also discussed the roles both fun and motivation could play in both engaging learners and helping them to learn:

The most intriguing part in educational games is enjoyment. Games are attractive because they are fun, and thus people get motivated to play. It is the magic of intrinsic motivation that makes games appealing for all ages and groups of people. If the game is well-designed, learners might spend hours playing it without realizing the time they spent on it.

Participant 13's succinct statement that "games are fun!" summed up the beliefs of multiple participants about gaming in the discussion threads.

Other commonly expressed beliefs about the *pros* of gaming were that it promotes interaction and collaboration among L2 learners. As Participant 3 noted, "[h]aving a visual and game like setting makes it fun and interactive." Participant 16 extolled the ability of gaming to promote community, collaboration, and positive relationships among learners. Participants 4 and 12 shared views similar to hers about gaming's impact on collaborative learning.

Learner outcomes were another game-related topic in the discussion threads. Participant 2, for example, stressed the role games can play in cognitive development:

games can promote the learners' cognitive development according to Piaget's play and imitation theory. He believed that while playing, children can rehearse newly formed concepts for the sake of assimilation. Then, when they encounter new experiences, children use imitation to build new mental models, which leads to accommodation ([Van] Eck, Shute, & Rieber, 2018).

Participant 15 expressed similar views with her summary of the various positive learner outcomes games can produce: "games can promote learners' cognitive development, self-regulation, autonomy, problem-solving skills, and I think they can also help improve concentration, retention, communication skills, and so on." In addition to cognitive development,

the participants pointed out the positive impact gaming can have on language learning. Among the many examples was Participant 1, who suggested that the listening and reading involved with playing games could help improve comprehension of the target language. Other participants discussed the perceived impact of different varieties of games. For example, Participant 7 related that bingo had helped her students learn vocabulary, and Participant 8 suggested using a game such as *The Sims* to work on L2 learners' understandings of prepositions of place.

In addition to the *pros* of gaming, some participants also pointed out potential *cons*. While the amount of text focusing on the *cons* of gaming was relatively less than that devoted to its *pros*, the participants identified a seemingly large number of different types of *cons*. Rather than discussing each one in detail, which may inaccurately give the impression that the participants' perceptions of gaming were more negative than positive, I have listed the identified *cons* here:

- the need for resources to be able to employ games (e.g., money, hardware, software),
- a lack of games for adult learners,
- a mistaken assumption that games are always effective and efficient means of learning,
- the potential to use games merely as a means of avoiding boredom,
- games created for commercial purposes (e.g., sales profits) rather than educational purposes,
- that educational games may not be as interesting to L2 learners as commercial games,
- the potential of games to promote language use that is inappropriate or inaccurate,
- potentially inappropriate contents (e.g., sexual, violent), and
- taking up classroom time with game-related activities such as starting the game or logging in to websites.

While this list of perceived cons of gaming may appear large in number, the majority of the participants had generally positive views of gaming in L2 education.

Posts about the rationales for game use in L2 education also appeared frequently in the discussion threads. While the *pros* of gaming served as implicit rationales for their use in L2 education, the participants also explicitly discussed the need for educators to devote thought to their purpose. Or, as Participant 1 put it, “teachers should understand the rationale behind using games in learning.” In this vein, multiple participants stressed the need to use games for learning purposes. In fact, at least four different participants (Participants 2, 4, 5, and 15) expressed beliefs that L2 learners should play games “*with a purpose and for a purpose*” (italics in original) (Liontas, 2016, p. 15), which was a phrase they borrowed from the course instructor and a journal he article he had authored. Participant 15, for example, summarized and concurred with a classmate’s views by stating, “gaming activities need to correlate closely with the language goals, or else there is no need for employing games in the language classrooms.” Other participants stressed the need for teachers to distinguish between games designed for educational purposes and those created for commercial reasons. One of them, Participant 5, cautioned that the latter type may include contents inappropriate for educational purposes and showed concern that teachers may “be confusing the two categories.”

Theme 2: ET-related training, support, skills, and knowledge. The second major theme present in the asynchronous discussion threads concerned ET-related knowledge, skills, training, and support. This theme focuses more on knowledge *about* technology, which differentiates it from the fourth theme I will discuss, which involves acquiring knowledge about target languages *with* technology. For Theme 2, I could identify two sub-themes:

- ET skills and knowledge, and

- ET training and support.

I discuss these sub-themes in the following paragraphs.

ET skills and knowledge. Many of the participants discussed topics related to the ET skills, knowledge, and experience they possessed, lacked, and/or wanted to acquire. Multiple participants indicated that although they learned much about educational technology during the course, they realized they still did not possess as much knowledge as they would like. Others noted that their knowledge of technology improved from taking the course. Participant 12, for example, indicated her knowledge of MALL and CALL had expanded due to her participation the course. Her classmate, Participant 11, credited the course with giving her a better understanding of past and present states of educational technology. Participant 15 noted that due to the amount and complexity of new technology it's easier to keep up with how to employ technology than to learn the technological details that underlie new tools: "what happens and how it works in between is commonly left unknown."

In addition to discussing their own ET-related knowledge or skills, the participants also discussed those of L2 educators in general. For example, Participant 9 suggested teachers should acquire knowledge about educational technology to be able to teach. Expressing a similar view, Participant 10 noted that teachers do their students a disservice if they themselves do not keep up with technology. For many of the participants, a one-time acquisition of ET knowledge would not suffice. They believed that teachers, including themselves, need to stay abreast of new educational technology developments. In fact, multiple participants (e.g., Participants 10, 13, 16) employed the phrasal verb "keep up" in discussions of ET-related knowledge.

ET training and support. In addition to the need for ET-related knowledge, multiple participants discussed how educators may go about acquiring it. Primarily, they promoted

professional development, training, and support “on how to successfully use it [ET] in the classroom,” as Participant 16 put it. Regarding this topic, Participant 5 cautioned that “we should not assume that everyone [students and teachers] can utilize the technology automatically.” Their classmates, including Participants 4, 7, 9, and 15, also voiced concerns that teachers need training or support in order to be able to employ ET effectively in their classrooms.

As these examples of the participants’ posts indicate, ET-related knowledge, training, and support were the core of a major theme in the discussion threads. The participants indicated that teachers, including themselves, needed to not only acquire knowledge of educational technology, but also “keep up” with educational technology developments. Multiple participants viewed teacher training and support as key to developing ET skills and knowledge.

Theme 3: L2 learners and educational technology. The third of the five major ET-related themes present in the online asynchronous discussion threads concerned connections between L2 learners and educational technology. In particular, the participants discussed their responsibilities and the responsibilities of other L2 educators to understand L2 learners’ needs and identities and to develop learner-centered education that prioritizes individualized learning and L2 learners’ agency and autonomy.

Discussions about L2 learners and their identities included a focus on the need to identify and understand their personality characteristics, particularly in order to make informed decisions regarding the effective implementation and employment of educational technology. Multiple participants stressed that knowledge of learners and their identities could help teachers, including themselves, accommodate individual students’ characteristics and achieve educational goals. Participant 9, for example, expressed the need to understand learners by borrowing a phrase, “smelling your students,” from the course instructor. In the discussions, multiple participants

recognized discrete categories of L2 learner characteristics and stressed that educators should become aware of them. These discussions focused primarily on learners' needs, learning preferences, and prior knowledge, including ET knowledge or skills. One example is Participant 14, who, in a discussion of TESOL's "6 Principles" (TESOL International Association, 2019), suggested that "[p]art of knowing your learners is knowing their level of technology." In addition to the topic of L2 learners in general, Participants 4, 10, and 16 further stressed the need to recognize and attend to students with disabilities or learning disorders.

The participants' ET discussions also focused on helping learners' explore and express their identities and voices. Participant 8 succinctly linked ET, identity, and voice, and essentially summarized other participants' posts, by stating, "[t]echnology brings lots of opportunities to provide learners a platform to have their voices and develop their identity in their second language." Participant 2 expressed similar views: "As mentioned in the readings, learners can develop their agency and identity by participating in online discussions [*sic*] and platforms." In addition to addressing related issues, participants also employed multiple labels for L2 learners' identities, including *digital natives*, *the internet generation*, *Generation Z*, and *new generation*. Note that the first two are technology-related.

The participants' discussions also included a focus on how learner-centered education and individualized learning influence decisions regarding ET-related pedagogical practices or which types of educational technology to employ. However, the participants' focus on these topics may have been related to their appearance in PowerPoint slides the course instructor had employed in class, which Participant 4 mentioned in a discussion thread post, and course readings (e.g., Lontas, 2006), which Participant 9 noted in another post. Addressing the topic of student-centered education and technology in the discussion threads, Participant 15 stated in

strong terms: “No matter how fancy the new technology looks like, it is not the panacea; only the ones that are learner-centered, addressing the needs and interests of diverse learners, and providing authentic learning materials deserve our serious consideration.” Participant 2 agreed with her, stating it “is crucial to align the technology we are using with the students' preferences, styles, needs, and skills.” Many of the other participants (e.g., Participants 5, 10, 11, 13, 16) agreed with them about the need for learner-centered education in contexts involving educational technology.

Learner autonomy, in relation to educational technology, was another topic of frequent discussion. Multiple participants believed technology in general (e.g., Participants 2, 3, 15) and/or specific types of technology could promote learner autonomy. Participant 2 summed up the former type of beliefs with this succinct statement: “Technology is a great tool to promote autonomous learning.” Participant 15 indicated she believed that learner autonomy should be among the factors educators take into account when making choices and decisions about implementing educational technology. The participants also discussed specific types of educational technology that could have a positive impact on learner autonomy. These included gaming (e.g., Participants 2, 7, 9), technology-based assessment (Participant 3), a language learning tutorial (Participant 11), and CALL (Participant 7). Regarding CALL, Participant 7 expressed her strong convictions on this topic thus: “As some [*sic*] who has a research interest in CALL, I truly advocate for the use of CALL tools to engage ELs and to promote learners' independence.”

As these descriptions and illustrations from the participants' posts indicate, one of the major themes in the online asynchronous discussion threads related to the dynamics among educational technology, learners, and learner characteristics. In particular, the participants

recognized a duty for educators, including themselves, to deepen their understandings of their students in order to develop learner-centered pedagogy that individualizes learning and promotes learner autonomy. They also expressed beliefs that technology, if chosen to meet learners' needs, has the potential to help promote positive learning outcomes.

Theme 4: employing educational technology to learn L2. The fourth major ET-related theme in the online asynchronous discussion threads involved discussions of learning *with* educational technology, as opposed to learning *about* it, along with rationales and decisions regarding its pedagogical uses. In contrast to Theme 3, which focused on how ET can be responsive to individual learners, Theme 4 relates to the nature of learning opportunities and learning outcomes that ET facilitates. Throughout the discussion threads, many participants expressed beliefs that educational technology can facilitate target language use, learning, and acquisition. These were also frequent rationales for the implementation and employment of educational technology. Within Theme 4, I could identify the following sub-themes:

- broader communication opportunities and contexts;
- ET's facilitation of language acquisition; and
- critical thought and effective ET employment.

I discuss each of these sub-themes in the following paragraphs.

Broader communication opportunities and contexts. The participants indicated they believed technology increases opportunities for students to communicate with more modalities, and with more people and more kinds of people, including those beyond the walls of their schools. Participant 9, for example, noted that educational technology affords more ways of employing new knowledge and more chances to “*communicate with other learners*” (italics in original). Participant 8 also expressed her belief that technology brings people “around the

world” into contact, and that it offers “different modes of communication.” Others expressed similar beliefs, including Participant 15, who stated that the plethora of “digital tools” that are available can facilitate L2 learning and the expression of opinions.

ET’s facilitation of language acquisition. Another common sub-theme within the theme focusing on learner outcomes (i.e., Theme 4) was the ability of educational technology to facilitate language acquisition. Participant 5, for example, noted that educational technology enables students to increase acquisition and retention of language. Participant 12 stressed that when developing or employing CALL she considers its ability to “highlight main information [take away information] in my lesson.” (The words in brackets appeared in the original text.) Participant 16 noted that watching TV program episodes, and playing video games related to those episodes, helped her children learn target language vocabulary, and improve their listening ability and speaking fluency. Participant 11 similarly stated that her own “understanding of the English language was propelled further due to technology in general things, such as movies.” The participants, as these examples suggest, believed that educational technology can improve L2 acquisition.

Critical thought and effective ET employment. While multiple participants believed that educational technology can have a positive impact on learning experiences and outcomes, some also cautioned that critical thought was necessary to implement and employ it effectively. Participant 10, for example, cited Liantas (2018b) to argue that selections of types of ET should be based on a desire to “support our learning outcomes” instead of a desire to merely employ what types of technology are available. Concerning its employment, Participant 11 cautioned that educational “technology should not be used as a crutch so that students don't have to speak in class.” Other participants warned that educational technology was not a panacea for L2 learning.

On this topic, Participant 15 noted that regardless of the manner of ET use, “the core of second language teaching and learning stays the same.” As these examples illustrate, many of the participants believed that while educational technology improves L2 learning, its efficient implementation and employment depend on critical thought about its purposes and roles.

Theme 5: the participants’ doctoral course. The fifth and last of the major themes in the online asynchronous discussion threads involves the participants’ perceptions of course-related topics. In particular, this theme encompasses discussions related to the following three sub-themes:

- goals and aspirations for the course,
- learning outcomes, and
- the digital storytelling project and digital storytelling in general.

The reason I added discussions about digital storytelling in general to those of the DS project because participants’ posts regarding them is that frequently occurred together. In the following paragraphs, I discuss each of the three sub-themes related to the participants’ perceptions of their doctoral course.

Goals and aspirations for the course. The first of the course-related sub-themes involved the participants’ personal goals, expectations, and aspirations for the course. However, one of the reasons these topics may have appeared in the discussion threads is that they were included in course instructor’s prompt for Week 1’s discussion. The prompt read, in part, “Considering your possible completion of FLE/SLA doctoral courses to date, what are your goals and aspirations for this summer tech course?”

Many participants stated they desired different types of ET knowledge, including general, specific, practical, and comprehensive. They also discussed rationales for wanting this

knowledge, or how they hoped it would help them in the future. The following statement by Participant 10 is an example of a desire for general ET knowledge: “I am interested to learn more about the use of technology as a medium for rich language learning to take place.” Participant 3 expressed similar desires about learning from the course instructor: “I hope to learn how technology can benefit learning a second language from an expert in the field.” Desires for practical and specific types of ET knowledge also appeared in the discussions. Participant 7, for example, stated that “[t]hrough this course, I aim to develop teaching and learning materials and resources as applied to CALL for adult ELLs and educators.” Other participants expressed similar learning goals, such as Participant 8, who shared Participant 7’s desire to learn about CALL, and Participant 2, who wanted to learn about software applications. Comprehensive knowledge was the stated goal of Participant 4, who posted that she wanted to learn “how technology has evolved; what kind of technology is being applied to the process of language acquisition; which one is being more effective, etc.”

Rationales for learning about educational technology and engaging in ET-related professional development, along with plans to use new knowledge of educational technology in the future, featured prominently in the discussion threads. Participant 14, for example, indicated she thought knowledge gained from the course would assist her in her “future professional career,” and Participant 16 had similar expectations for her “professional development.” Participant 4 shared their views about their doctoral course on educational technology, stating “[l]earning is my goal because it is the means to succeed in the field I am working on, it is the language education.” However, Participant 3’s rationale for learning about educational technology focused on students because, as she put it, “the new generations are more digitally savvy.”

Most or all of the participants indicated they were interested in learning about educational technology. While these discussions appeared throughout the six weekly discussion threads, they were most prominent during Week 1's discussions, perhaps because its prompt asked the participants to post about their learning goals for the course. As the many examples above illustrate, the participants expressed desires to gain general, specific, practical, and/or comprehensive types of ET knowledge. Additionally, they discussed the reasons for their learning aspirations and indicated ways they might employ their new knowledge in the future.

Learning outcomes. While learning aspirations were a focus of discussion at the outset of the course, later discussions, particularly those in the final week (Week 6), turned to knowledge gains. As with their earlier discussions of learning aspirations, the participants discussed acquisition of both general and specific types of ET knowledge. However, they also reflected critically on their new knowledge and credited the sources of it.

Discussions of the acquisition of relatively general educational technology knowledge occurred frequently and involved a variety of perspectives. Participant 10's statement, "I learned so much in this class," summarized the perceptions of multiple other participants (e.g., Participants 4, 9, 10, 11, 13, 16) regarding the quantity or quality of their knowledge gains. Participant 3 expressed similar views, along with beliefs about the potential of educational technology in L2 education: "I gained more insights into the technological advances out there and realized that there are a lot out their [*sic*] that can be used as resources in language classrooms." Participant 2 also noted that she had learned about technological advances, and listed this as one of her favorite topics. Coming to understand the importance of digital literacy was a major take away for Participant 5.

In addition to describing the contents of their new knowledge, some participants also reflected critically on what they had learned. For example, Participant 15 came to realize that “the more I learn, the less I know.” Multiple participants also indicated they had acquired insight regarding rationales for ET use in L2 education. The following quote by Participant 4 reflected not only her views on this topic, but also those of some of her classmates: “[i]n terms of content, one of the most important lessons I learned during this course was to understand the vast possibilities technology has in education; but above all, how important is to use technology with a purpose.” Similar language regarding the rationale for ET use appeared multiple times throughout the six weeks of discussion threads. In particular, the participants frequently employed the phrase (or variations thereupon) “with a purpose and for a purpose” (Liontas, 2016, p. 15), which they appeared to borrow from the course instructor. Furthermore, multiple participants’ discussion thread posts indicated that the course instructor stressed, and the participants came to believe, that educational technology use should be purposeful.

While the participants frequently described ET-related general knowledge and insights they gained through participation in the course, they also recognized knowledge they gained about relatively more specific types of technology. The specific types of technology about which the participants had acquired knowledge included AI (e.g., Participants 2, 3, 7, 16), AR and VR (e.g., Participants 2, 7, 11, 16), CALL (e.g., Participants 7, 8, 9, 12), MALL (e.g., Participants 7, 9), software applications or online tools (e.g., Participant 10), and educational games (e.g., Participant 2). One among the many examples of the participants’ posts about these technologies comes from Participant 11, who indicated she had “also learned a lot from the AR and VR presentations because they can change the future and in many different ways.”

In addition to discussing what they had learned by the end of the course, the participants also discussed new ET knowledge in the Week 2 discussion threads, when part of the prompt asked, “*What do you consider the 3-5 most important lessons derived from reading these three articles ...?*” (emphasis in original). The three readings were two articles on CALL by Chapelle (1998) and Lontas (2001a), and one on annotation by Lontas (2001b). Some examples of “important lessons” learned are those of Participant 12, who described in detail learning that CALL material design needs to take into account learner interaction, be responsive to individual learners’ needs, and afford learners opportunities to notice errors in language production.

While the participants discussed the contents of new ET knowledge, and insights related to new ET knowledge, they also acknowledged the sources of their new learning. The majority of the participants credited the course, the instructor, his presentations and lectures, course readings, and classmates as sources of new knowledge. Multiple participants (e.g., Participants 11, 12) indicated they greatly enjoyed the course and found it very informative. Among the many examples of participants crediting the instructor, his research, and assignments are Participant 11, who noted that she had learned about CALL and annotations from him; Participant 2, who cited his articles on gaming and AI (Lontas, 2006, 2016) as being particularly informative; and Participant 15, who credited the instructor’s reading assignments for making the discussion thread activities more productive. However, in addition to the acquisition of academic knowledge, multiple participants indicated they benefitted from the instructor and his course in other ways. For example, Participant 4 thanked him for his “support and advice,” Participant 5 for his “guidance,” Participant 8 for “lifting our spirits up,” and Participant 8 “for all the efforts.” As these examples demonstrate, multiple participants credited the course instructor, his course,

and course materials for making contributions to their ET knowledge and providing them with support.

Other sources of knowledge the majority of the participants identified and appreciated were classmates and their discussion thread posts. The participants credited classmates with providing both general and specific knowledge about ET. One example of showing appreciation for general knowledge gains comes from Participant 2, who indicated she enjoyed “learning from their [classmates’] experiences.” Participant 11 similarly noted that she had learned “so much from the weekly discussions.” Participant 10 demonstrated a particularly strong sense of appreciation by stating, “I would like to say thank you to a wonderful group of people who inspire me to do better, be better, and think differently.”

In addition to general types of learning, the participants also appreciated their classmates for sharing relatively more specific examples of ET-related knowledge. Participant 15, for example, credited Participant 3 for pointing out that they needed an understanding of the history of educational technology and L2 education to be able to understand the present and predict the future. Participant 3, in turn, thanked Participant 7 for correcting misperceptions she believed she had about AI. Other examples come from Participants 4 and 5, who showed appreciation to Participant 14 for introducing them to what Participant 5 described as an “incredible resource” for creating animation.

In addition to crediting classmates for new knowledge, some participants added that their membership in their doctoral program seemed like being part of a *community*, *team*, or *family*, all of which were terms they employed. Participant 13’s views on this topic echoed those of many of her classmates:

It is truly an honor to be a member of the [doctoral program] family! I am proud and humbled by your guidance and support that you give me both as an individual and as a group/team of classmates. I have learned so much from each and every one of you, my [doctoral program] colleagues!

In addition to recognizing support she herself had received, Participant 13 suggested to another participant, who was new to the doctoral program, that she turn to other community members whenever she needs assistance.

The DS project and DS in general. Discussions about digital storytelling comprise the third major sub-theme of the theme on the participants' course. Digital storytelling discussions occurred relatively frequently in the discussion threads, which may be due to the following reasons: the course's digital storytelling project represented 40% of the final grade; it was a group project which necessitated a great deal of collaboration and communication among group members; and the Week 2 discussion prompt asked the students to discuss digital storytelling in general. In this sub-theme of the fifth theme of Research Question 1, I included posts about both the collaborative digital storytelling project and digital storytelling in general because the participants frequently discussed the two together. The participants' discussions about digital storytelling focused primarily on digital storytelling group members, perceptions of the digital storytelling project, perceptions of digital storytelling in general, and plans to employ digital storytelling in future teaching or research. I discuss each of these strands in the following paragraphs.

In their digital storytelling-related posts, multiple participants shared the sentiments of Participant 14, who offered "[m]any thanks to my group members for their collaboration and hard work." Participant 7 expressed similar gratitude to group mates, "who worked hard and

collaborated well to produce our digital storytelling project.” Participants also appreciated the benefits of collaborating, including Participant 8, who shared that “[w]e combined our strengths and came up with a product that we can be proud of.” Other benefits, according to Participant 2, included sharing knowledge and having fun during the creation process. In addition to these expressions of gratitude within groups, Participant 4 praised and congratulated another group whose digital story introduced her to technology with which she previously been unfamiliar.

Participants’ evaluations of the digital storytelling project, most of which were positive, appeared frequently in the discussion thread posts. Multiple participants indicated they found the project a pleasure, including Participants 2 and 10, who, in their words, “enjoyed” the collaborative work. Multiple participants also shared their rationales for their positive evaluations, such as Participant 12, who noted “[t]his project was creative and effective. It had served the purpose of us showcasing our knowledge of the field, technology, personalities, as well as being effective for a 6 weeks course.” For Participant 10, another positive aspect of the digital storytelling project was learning outcomes: she had “learned about more technologies such as Powtoon and Audacity with which I previously had been unfamiliar.”

While the majority of the comments were positive, some participants also discussed the demands of the digital storytelling project. Participant 14, for example, stated “[i]t was a real challenge designing 8 minutes of advertising video in a program that I used for the second time and in a limited period of time.” Participant 5 similarly noted that using video editing software was a challenge. However, while these two participants cited demands of the project, neither they nor their classmates expressed overly negative views of their digital storytelling experiences. To the contrary, the majority of the participants indicated they enjoyed and benefitted from the project.

Digital storytelling in general, not just in the context of the course project, was another topic that appeared with frequency in the discussion threads. One reason for this, as noted above, is that part of Week 2's discussion prompt asked the participants to share their thoughts about digital storytelling. The participants' discussions on digital storytelling focused primarily on its *pros*, including its potential uses in L2 education, and its limitations. I discuss each of these topics in the following paragraphs.

Many of the participants had generally positive views of digital storytelling and believed that it could be a useful activity in L2 education. The participants also pointed out the potential pedagogical uses of digital storytelling for teachers. For example, according to Participant 9, “[d]igital storytelling is still an effective means for providing new information.” Participant 15 expressed similar views, including that the multimodal affordances of digital storytelling make it particularly effective for teaching challenging material:

Since the strength of digital storytelling lies in its use of visual and auditory support, if I were to tell a story through digital technologies, I would prefer to focus on introducing the abstract concepts that might be difficult to explain through words.

As these examples illustrate, the participants considered digital storytelling to be an efficient medium to provide learners with access to new knowledge.

In addition to helping teachers transmit academic material, participants viewed digital storytelling as a means for students to find their voices and express themselves, and generally become more fully engaged in the process of learning. Participant 1 illustrated this belief thus: “Each learner has stories to tell in language classroom. Therefore, using storytelling is crucial to give students opportunities to talk about their experiences, cultures, and opinions by creating digital storytelling.” He also indicated he believed digital storytelling made it easier for students

to share their knowledge. Participant 7 expressed similar beliefs, stating, “I think assigning the students to do a digital storytelling with multimodality to present their narratives would increase student engagement.” Yet another classmate, Participant 12, supported a similar opinion with a statement from slides the course instructor had created. According to her, “The [instructor’s] quote mainly states that ‘by providing digital students with opportunities to learn in ways that satisfy their needs, they will be more engaged in the learning process and in realizing their potential’ (slide 21).” In general, the participants had positive perceptions about the value of digital storytelling in L2 education. Or, as Participant 10 put it, “[t]he possibilities are endless.”

Multiple participants expressed a personal interest in employing digital storytelling in their future teaching or research. Participant 7, for example, stated, “the fun digital storytelling project inspired me to apply it in my ELT” (English language teaching). Participant 2 had similar plans: “I am excited to use such a project with my students in the future.” While opposition to the use of DS in L2 education did not appear in the discussion threads, Participant 1 cautioned that “assigning students to create digital storytelling is not enough. Before planning to conduct storytelling, teachers consider the learning outcomes, resources that student need, and how teachers will give the feedback.” However, comments such as this were few in the discussion threads; the general consensus was that digital storytelling projects offered much potential in L2 learning contexts.

Summary of Research Question 1 discoveries. In this section of Chapter 4, which focuses on the discoveries for Research Question 1, I delineated the ET-related themes present in the online asynchronous discussion threads in which the participants engaged as part of their coursework. I identified five major themes that appeared in the asynchronous discussion threads. These themes involved the participants’ perceptions of the following: characteristics of ET in

general and specific types of ET; ET-related training, support, skills, and knowledge; the relationship between L2 learners and educational technology; employing educational technology to learn second/foreign languages; and the participants' doctoral course, including the digital storytelling project. I discussed each of these themes and provided multiple examples from the participants' posts to illustrate them and to let the participants speak in their own words. In the next section of Chapter 4, I delineate the discoveries for Research Question 2, which focuses on the educational technology-related themes present in the participants' digital stories.

Research Question 2: ET-Related Themes in Digital Stories

In this section of Chapter 4, I address the discoveries for the second research question, which asks, *What are the educational technology-related themes embedded in the doctoral students' digital stories?* These digital stories were graded course assignments groups of participants collaboratively created to promote an educational technology of their choosing. Their intended audiences were language teachers involved in professional development training. I begin my report of the discoveries for Research Question 2 with a description of the members, contents, and length (minutes and seconds) of each group's digital story. Then, I describe the themes I identified in the digital stories. To provide support for my claims regarding the discoveries, and to allow the participants to speak for themselves, through a variety of modalities, I provide examples from the digital stories that illustrate the themes I identified.

Digital story topics and group members. To provide a background for the findings, in the following sections I briefly describe the following for each of the four digital storytelling groups: the members of the group, the contents or topics of their digital story, and the digital story's durations (minutes and seconds) (see Table 13). The course instructor allowed the participants to form their own digital storytelling groups. The descriptions of the languages the

participants speak, and the proficiency levels at which they speak those languages, are based on the participants' self-assessments, which are data I obtained from the surveys and semi-structured interviews. The instructor also gave the participants the freedom to choose the type of educational technology they would promote in their digital stories. He set the maximum length of each digital story at ten minutes.

Table 13

Digital Storytelling Groups and Targeted ET

Group	Total Members	Participants	Targeted Type of ET	Duration (minutes: seconds)
1	5	1, 2, 3, 6, 12	games and immersive technologies (VR in particular)	8:53
2	4	4, 13, 16, 17	LMS (Canvas in particular)	10:45
3	5	5, 7, 8, 15, 17	Google Docs, Slides, and Forms	10:33
4	4	9, 10, 11, 14	AR	8:13

Note. Participant 17, who was an observer in the course but not enrolled in it, participated in Group 2's video as a narrator and Group 3's video as an actor.

Group 1. Group 1 consisted of five members: Participants 1, 2, 3, 6, and 12. According to the survey and semi-structured interview data, as well as my personal knowledge of some of the members, all five members of Group 1 were native speakers of Arabic and were at advanced or native levels in English. Participant 3, however, was a native speaker of both Arabic and English. Group 1's digital story promoted the use of gaming, VR, and AR in L2 education. The first section of Group 1's digital story included interviews that Participant 6 conducted with three students he appeared to encounter randomly at the university's main library. In these interviews, he asked the students questions about their perceptions of education technology. Participant 3 narrated the other sections of Group 1's digital story. Their digital story was 8:53 (minutes, seconds) in length.

Group 2. Group 2 consisted of three students in the course (Participants 4, 13, 16) and Participant 17, who was an observer but not officially enrolled. Participants 4, 13, and 16 were native speakers of Spanish and advanced-level speakers of English. Participant 13 was a native speaker of both English and Spanish. Participant 17 was a native speaker of Chinese and an advanced-level speaker of English. The first section of Group 2's digital story consisted of the first narrator, Participant 13, urging teachers to use technology such as LMS in K–12 environments. In her arguments she employed her own experiences and perceptions of teachers' resistance to LMS use in her own local school district. The second section of Group 2's digital story began with the second narrator, Participant 17, providing background information on Canvas, an LMS platform. He then modeled how to create the contents of a Spanish-as-a-foreign language class in Canvas. Group 2's digital story was 10:45 (minutes, seconds) in length.

Group 3. Five participants were involved in the production of Group 3's digital story: Participants 5, 7, 8, 15, and 17. However, Participant 17, who served as a narrator for Group 2's digital story, also participated in Group 3's digital story as an actor. All five participants in Group 3 were multilingual doctoral students with international backgrounds who spoke a variety of different languages, including English, Chinese, Malaysian, Indonesian, and Turkish. Group 3's digital story focused on promoting the use of Google Apps, particularly Google Forms, Docs, and Slides, in L2 education. All three of these Google Apps are online tools that allow multiple users to create and edit different types of documents simultaneously. Google Docs is an online word processing tool (<https://www.google.com/docs/about/>), which is similar to Microsoft Word; Google Slides is online presentation slide software (<https://www.google.com/slides/about/>) that is similar to Microsoft PowerPoint; and Google Forms is an online tool that allows users to collect information from people, which means they can serve as surveys or assessments

(<https://www.google.com/forms/about/>). All three of these Google Apps enable multiple people to edit documents simultaneously. Unlike the other three groups' digital stories, much of Group 3's video consisted of the participants acting out skits in which they employed Google Apps in ESL classroom contexts. Participants 7, 15, and 17 acted as students and Participant 8 acted as their teacher. Participant 8 additionally provided narration for their digital story. Participant 5 served as the editor of their digital story; however, he did not appear in its skits as an actor. Group 3's digital story was 10:33 (minutes, seconds) in length.

Group 4. Group 4 consisted of Participants 9, 10, 11, and 14. While all four participants were multilingual, two were native speakers of English and two spoke Arabic as their first language. Their digital story focused on promoting the use of AR in L2 education. However, unlike the other groups who constructed their digital stories primarily with video clips or narrated still images, Group 4 created the majority of their digital story with an animation software application called PowToon (PowToon Ltd., 2020). Participant 10 narrated the animated portions of their digital story. The one section of their digital story that was not animated was a brief promotional video for a VR software application called Google Expeditions (Google, 2017). This video clip, which was a production of the Google company, was one minute and nine seconds long. In total, Group 4's digital story was 8:14 (minutes, seconds) in length.

Themes identified. To identify themes in the digital stories, which the participants expressed with multiple modalities (e.g., spoken language, written language, images, music), I employed both inductive and deductive analysis. For the former, I employed Constant Comparative Methods (Corbin & Strauss, 2008), and for the latter I primarily applied multimodality concepts from Unsworth's (2006) theories on image-text relations. For both data

exploration methods, I employed qualitative data analysis software, MaxQDA, as a tool to make notes, and to create and organize codes. Through these processes I was able to identify the following three major themes in the digital stories:

- the impact of educational technology use on the processes, products, and learners in L2 education;
- the identities and roles of teachers and students; and
- the notion of change and adaptation.

To provide evidence of the themes and to allow the participants communicate with their own multimodal voices (e.g., oral and written language, music, static and moving images), I provide multiple examples (e.g., screen shots, digital story transcripts) from the participants' digital stories. In the following paragraphs, I address each of the three themes individually.

Theme 1: Impact of ET use on the processes, products, and learners. One of the main themes in the participants' digital stories was the positive impact that educational technology can have on the processes, products, and students in L2 education. The participants employed these *pros* of educational technology as rationales for using the types of technology they promoted in their digital stories. The domains of the positive impact educational technology can have included (tele)collaboration and learner affect (e.g., motivation, emotions). I address the discoveries for these sub-themes in the following paragraphs. However, following that, I also provide a summary of the participants' perceptions of the types of educational technology they promoted in their digital stories because the participants perceived each of them in different ways. The educational technologies the participants promoted were immersive technologies (AR, VR), Google Apps, Learning Management Systems (LMS), and educational games. To avoid redundantly stating the same findings, descriptions of the impact each individual educational

technology may have on the processes, products, and learners in L2 education are limited to brief summaries.

(Tele)collaboration. One of the major sub-themes in the theme of educational technology's impact on the processes, products, and learners in L2 education was the potential for educational technology to enable and promote collaboration, collaborative learning, and/or *telecollaboration* among L2 learners. Group 3 cited Dooly (2017) to provide the following definition of *telecollaboration* in their digital story:

In *The Handbook of Technology and Second Language Teaching and Learning*, edited by Chappelle and Sauro, Dooly defines telecollaboration as a way of collaborating and working together with other people to produce an outcome through online or digital communication tools.

In the following paragraphs I describe the ways in which the digital storytelling groups perceived educational technology as a means of enabling (tele)collaboration.

Among the four digital storytelling groups, Group 3 discussed (tele)collaboration the most. In particular, Group 3's digital story focused on three kinds of Google Apps, Docs, Slides, and Forms, which are online tools that enable users to collaboratively create and edit word processing documents, presentation slides, and surveys or assessments, respectively (<https://get.google.com/apptips/apps/#!/all>). Throughout their digital story, Group 3 emphasized the ability of Google Docs, Slides, and Forms to enable collaboration or telecollaboration. A large portion of Group 3's digital story involved the participants acting out skits that illustrated how teachers and students can employ these online collaborative tools. In many of the scenes in their digital story the participants worked collaboratively and/or with a teacher. However, in addition to the acting, the narrator of Group 3's digital story (Participant 8), also addressed the

audience and explicitly stated the ability of the three Google Apps to enable collaborative learning.

One example of Group 3's dramatizations was a scene in which three participants (Participants 7, 15, 17) acted out a skit demonstrating how difficult it can be to collaboratively write a text without telecollaboration tools such as Google Apps. One of the actors asked the other participants playing the roles of students, "Shall I work on my part first and then send it to you, and then you work on yours and then send it to her?" While Group 3 did not explicitly state so, the point they appeared to make was how inconvenient it can be to have a group of people collaboratively write and edit one document without Google Apps.

Group 3 also explicitly mentioned collaborative learning in parts of the digital story that did not involve dramatization. The narrator (Participant 8) employed variations of the lexeme *collaborate* (e.g., *collaboration*, *collaborative*, *collaboration*, *collaborating*) and *telecollaborate* (e.g., *telecollaborate*, *telecollaboration*) multiple times in their digital story. One example of this occurred near the end of the digital story, when the narrator (Participant 8) addressed the audience of the digital story directly and suggested they employ Google Apps "[b]ecause Google Apps make collaboration easier. Students can create a common product by interacting with each other and accomplish the given task together."

Group 3 also employed the multimodal affordances of digital storytelling to promote the ability of Google Apps to enable telecollaboration. One multimodal method they employed was *instantiation*, a type of ideational *concurrency* (Unsworth, 2006). One example is a scene in their digital story when the narrator states, "Google Slides is similar to the PowerPoint, but it's built for online collaboration, which means you can simultaneously edit your slides." While the narrator stated this, we can see an example of three participants (Participants 7, 8, and 15) editing

a Google Docs slide at the same time (see Figure 5). In this case, the narration represents a generally occurring event (i.e., L2 students collaboratively editing slides) while the image is one specific *instance* of it. As this example and the others illustrate, Group 3 employed dramatizations and directly addressed the audience to extoll, in both explicit and implicit manners, the ability of the three Google Apps (Docs, Slides, Forms) to enable telecollaboration.

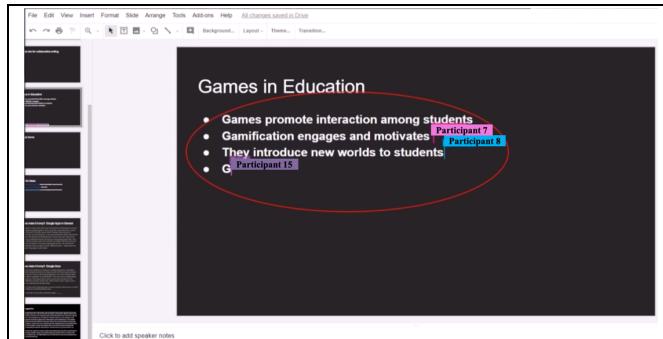


Figure 5. Example of ideational *instantiation*. This image and the narration are an example of *instantiation*, a type of ideational *concurrency* (Unsworth, 2006) Group 3 employed to stress that Google Forms enable (tele)collaborative learning.

Collaboration was also a focus of Group 2’s digital story, although they did not stress it to the degree Group 3 did. In the first half of Group 2’s digital story, the narrator promoted LMS adoption and employment as a means for students and other stakeholders to communicate and collaborate in order to “to prepare the next generation of leaders.” In one particular scene (see Figure 6), Group 2 employed ideational *concurrency* by expressing the same type of ideational meaning with multiple modalities (Unsworth, 2006). The image that appeared during this scene seemed to represent either “the next generation of leaders” or perhaps current stakeholders who need to communicate and collaborate to become future leaders.



Figure 6. Ideational *concurrency* with images and spoken language. In this scene, Group 2 employed ideational *concurrency* by employing an image that represented the types of people the narrator mentioned.

ET, affective factors, and motivation. Perceptions about the positive influence educational technology may have on affective factors (e.g., enjoyment, boredom, anxiety) and motivation (Dörnyei, 1994) was another sub-theme of the impact educational technology may have on outcomes, processes, and/or learners. The participants focused on this sub-theme frequently throughout their digital stories. The affective factors the digital storytelling groups primarily focused on were motivation, enjoyment, and the avoidance of negative affect (e.g., frustration, boredom). I address these topics in the following paragraphs.

A common claim in the digital stories was that educational technology can make L2 learning enjoyable and help avoid the boredom that may accompany traditional approaches to education. One example is a video clip Group 4 embedded in their digital story, which was a brief (1 minute, 9 second) promotional video Google produced for an AR tool called “Google Expeditions” (Google, 2017). This video included scenes of young students becoming excited in science lessons when employing AR to view natural phenomena such as volcanoes and tornadoes (Google, 2017). The tones of their voices and their facial expressions suggested they enjoyed the experiences. Google, and Group 4 who *chose* (Kress, 2003) to include the Google Expeditions clip in their digital story, appeared to promote AR technology by stressing that it can make learning fun and engaging for students. Other examples of the digital storytelling groups’

claims that immersive technology can make learning enjoyable occurred in Group 1’s digital story. In one particular scene, their digital story employed a still image of a child who appeared to wear VR goggles while she extended her hand to touch or grasp some “virtual” item. Her facial expression seemed to suggest excitement (see Figure 7).

Figure 7 also represents another example of Group 3’s employment of *ideational instantiation*, a type of *ideational concurrence* (Unsworth, 2006), to promote the use of immersive games in L2 education. This image appeared following a quote by Lontas (2016) that Group 3 displayed in their digital story. The relevant part of the quote states that immersive experiences “invite dynamic exploration and discovery by students and teachers alike. These thought-provoking game experiences are interactive in nature, engage students socially, prevent boredom...” (Lontas, 2016, p. 13). The image represents an *instance*, or example, of immersive experiences that Lontas (2016) described (Unsworth, 2006).

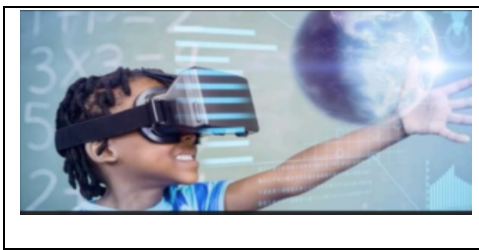


Figure 7. VR and learner affect. A child appears to be excited while employing VR goggles.

In addition to students finding educational technology use exciting, Group 2 seemed to indicate that teachers may also become similarly excited or motivated. While Group 2’s narrator (Participant 13) discussed “21st century teachers” employing educational technology, a still image of what appeared to be excited professionals, perhaps teachers, appeared on the screen (see Figure 8). A possible interpretation of this scene is that the use of educational technology can make the work of teachers exciting. This image represents an example of the employment of *ideational augmentation*, in which one of the modes adds to the meaning of the other mode(s)

(Unsworth, 2006). The narration indicates that “21st-century teachers” who employ educational technology will keep their jobs, but the image *augments* that meaning by suggesting that it is something about which the professionals (presumably teachers) in Figure 8 are happy.



Figure 8. Professionals excited to use educational technology. With this image, Group 2 expresses a view that ET use can be exciting and motivating for professionals.

Group 2 addressed teacher affect in another scene in their digital story (see Figure 9).

This scene consists of a still image of what appears to be a cartoon teacher seated at a desk in a classroom full of students (see Figure 9). The title of the scene is “IF YOU CAN’T BEAT’EM...” (emphasis in original). In the scene, the teacher types and sends the following text to his students: “ISN’T THIS GR8?.. ;-) TXT ME YOUR HOMEWORK... TX” (emphasis in original). The use of the word “GR8” (great) in the teacher’s message and the expression on his face seem to imply the teacher enjoyed employing his smart phone. The text “GR8” (great) and the teacher’s facial expression are another example of *ideational concurrence*, but with a relatively high degree of *redundancy* (Unsworth, 2006), as both modalities (i.e., the image and the written text) suggest largely similar meanings.

In addition to using images, spoken language, and written language, the digital storytelling groups also employed background music to express positive emotions. While one purpose of this background music may have been to make the experience of watching the videos more pleasant, the digital storytelling groups’ employment of the music also tended to coincide



Figure 9. Educational technology and teacher excitement. Classroom teacher appears to enjoy employing a smart phone and SNS messages with his students.

with sections of their digital stories in which they discussed the benefits or enjoyable aspects of employing educational technology to learn other languages. Group 1, for example, employed light or exciting music when discussing the positive roles VR and gaming can play in L2 education. What seemed to me to be similarly pleasant music played during much of Group 4's digital story. For example, this music accompanied Group 4's discussion of the impact ET-enhanced motivation can have on learning. During the second half of Group 2's digital story, light piano music played softly in the background while the narrator, Participant 17, described the various functions of Canvas, a type of LMS. Group 3, who advocated the use of Google Apps (Docs, Slides, Forms) similarly employed light background music throughout much of the narrated sections of their digital story. While this is only subjective assessment on my part, the background music the four groups employed seemed to serve to create a light or happy mood during their discussions of educational technology.

The participants mentioned or discussed motivation multiple times in their digital stories. One example, which I mentioned above, was Group 4's assertion that the use of AR has a positive impact on learner motivation. Group 4 stated the following about the benefits of enhancing motivation: "Increased motivation positively impacts academic achievement, and if

the students are engaged in interacting with other learners, they are likely to remember more, ask more questions, and think critically about the lessons.” Group 4 further stressed that motivation positively correlates with academic achievement and that with improved motivation, L2 learners will “Remember more,” “Ask more,” and “Think critically.”

Feelings of frustration associated with L2 teaching or learning, or how to avoid them, was another topic that appeared in the digital stories, particularly those of Groups 2 and 3. Group 3 stressed that the use of their targeted technology, Google Apps (Docs, Slides, Forms), may help L2 learners avoid feelings of frustration. Group 3’s digital story, which included multiple dramatizations, began with a skit in which a student lost the text he had worked on due to what appeared to be a hardware or software problem. Through the use of dramatic music, the actor’s voice and gestures, and images, Group 3 conveyed a sense of frustration the actor felt when he lost his work due to a technical problem. Figure 10 is an example of two images Group 3 employed in this scene. These images appeared to express the frustration, shock, or other negative affect computer users may experience when their computers fail to save their data or documents. Dramatic background music played during these scenes, which seemed to underscore the shock or frustration of losing data or documents.

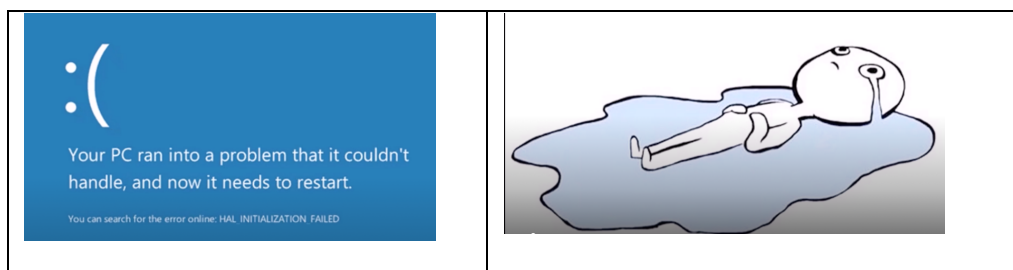


Figure 10. Frustration caused by losing data. These images in Group 3’s digital story represent the frustration or otherwise negative affect computer users experience when devices fail to save data or documents.

Group 2 discussed frustration and similar negative feelings that result from a lack of collaboration or support from school stakeholders. Participant 13, one of the two narrators for

Group 3’s digital story, shared different types of ET-related frustrations she had experienced: “I have experienced the frustration of a teacher for the lack of support from my school and district and frustration as a parent with inconsistent collaborations with teachers and schools.” She also noted her frustration with the failure of a school, or schools, to integrate educational technology: “the agonizing delay of what should have been easy and wise decision making for functional and emerging technologies in the school classrooms, which school leaders have failed to prioritize for students.”

During Participant 13’s discussion of frustration with communication- and ET-related dysfunction, the digital story displayed a series of images suggesting the same emotion (see Figure 11). One image showed a man with his head on a desk, flanked by two large piles of papers. Another image showed a woman who appeared to be half-buried in a pile of papers that towered above her head behind her. Yet another image showed a pair of hands extending from a large pile of papers, holding a sign that read, “HELP.” As these examples illustrate, the notion of ET-related frustration or other negative affect, as it applied to both students and teachers, appeared prominently in the digital stories of Groups 2 and 3.

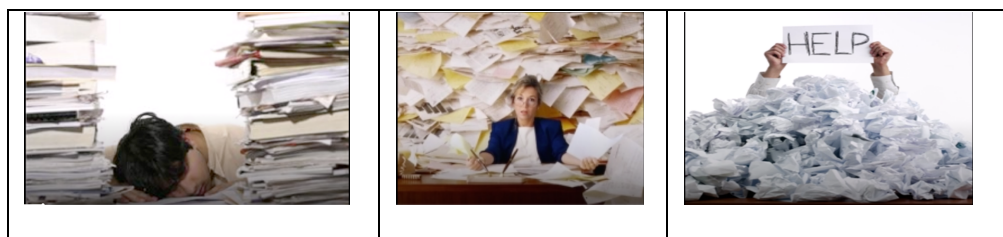


Figure 11. Teacher frustration. Images from Group 2’s digital story suggest frustration or other negative affect teachers experience when schools or school districts fail to provide them with support for ET.

Specific types of educational technology. In the paragraphs above I discussed the impact that educational technology may have on L2 education. In this section of the findings I turn the focus to the beliefs about the four specific types of educational technology the participants

promoted in their digital stories: immersive technologies (i.e., AR, VR), three kinds of Google Apps (Docs, Slides, Forms), Learning Management Systems (LMS), and educational games. As the participants' digital stories were meant to be promotional videos, they focused on what the participants believed to be the strengths of their chosen educational technologies. The participants' arguments included descriptions of the particular ET's *pros* and illustrations of how to employ the educational technology effectively in L2 education. I describe the ways in which the participants promoted the individual types of educational technology in the following sections. However, to avoid redundancy with other sections of Research Question 2 discoveries (i.e., those I covered above), these descriptions are brief.

Immersive technologies, AR and VR, were the subject of more attention in the digital stories than any other type of educational technology. Group 4 focused on the use of AR in L2 education, and Group 1 promoted both the use of VR and educational games. I discuss the participants' perceptions of both of these technologies in the following paragraphs.

Group 4 promoted the use of AR in their digital story. One of the main rationales they offered for employing AR in L2 education was a belief that motivation, which AR can engender, improves learning outcomes. A commercial advertisement for an AR app called Google Excite (Google, 2017), which they embedded in their digital story, supported this claim by showing primary school students excitedly talk about AR as they used it to learn about biology and natural phenomena (e.g., volcanoes, tornadoes). Group 4 also provided multiple examples of AR software applications that L2 teachers and students could employ to engage with multimodal learning material that make learning exciting. These examples of AR-based learning included goal-oriented group activities such as a treasure hunt and solving a murder mystery. The variety

of AR software applications supported Group 4's assertion that there are multiple ways to employ AR in L2 education.

Most of the discussion of VR appeared in Group 1's digital story, which also focused on educational games and authentic language use in L2 education. Group 1 offered multiple reasons for teachers and students to employ VR and games in L2 education, including that both of them promote engagement and interaction. In multiple scenes in their digital story, Group 1 employed still images of children who appeared to be enjoying or engrossed in VR learning experiences. According to Group 1, VR engages students effectively because it can immerse them in contextualized learning experiences that involve authentic language, culture, and communication. Group 1 pointed out that research, which they did not cite, indicates that authentic environments and physical activities, which VR may engender, can help students acquire vocabulary more effectively. Group 1 also stressed that educational games, including VR games, can be more effective ways for students to learn than traditional pedagogical approaches.

Group 3 was the only group to address Google Apps (<https://get.google.com/apptips/apps/#!/all>). The three types of Google Apps Group 3 suggested using were Docs, Slides, and Forms. Group 3 promoted their usefulness by describing and demonstrating how students and teachers can employ Docs to create word processor documents, Slides to create presentation slides, and Forms to create assessments. Throughout their digital story they asserted a strength of these online tools is their ability to enable telecollaboration. Google Docs' telecollaboration allows multiple users to edit documents simultaneously, which promotes collaborative learning. Another strength of Google Apps, according to the narrator of Group 3, is that user data is "automatically saved." Through dramatizations of ESL students and a teacher employing Google Apps, Group 3 illustrated how the automatic saving of data can

prevent the frustration and shock of data loss. Group 3 furthermore pointed out that L2 learners do not need to worry about saving their data because data storage is automatic.

Group 2's digital story focused primarily on advocating the use of Canvas, a type of a Learning Management System (LMS). The first section of the video, which Participant 13 narrated, pointed out how LMS can "simplify teaching and learning by connecting all the digital tools teachers use in one easy place." The other narrator (Participant 17) supported this claim by demonstrating the ease with which course instructors may employ the various functions and capabilities of Canvas. His section of Group 2's digital story included narrated screen capture videos of him creating contents and activities for a Spanish-as-a-foreign language course. The functions of Canvas he mentioned included embedding videos that can serve as models of target language interaction (e.g., self-introductions); creating online discussion threads as course activities; and developing formative assessment quizzes. According to Participant 17, another aspect of Canvas that makes it easy to use are the plethora of tutorials teachers can find for it on the internet. In addition, both narrators stated that LMS could serve as means for teachers to serve the needs of their students.

Multiple groups discussed or provided examples of educational games in their digital stories. The participants covered a variety of topics related to games or gamification in L2 education, including rationales for the use of gaming, learning outcomes resulting from games, and its impact on interaction and learner affect. I provide examples of these in the following paragraphs.

In their digital story, Group 1 employed the following quote by Chris Crawford, which appears in his book titled *The Art of Computer Game Design* (Crawford, 2011), to support the use of games in L2 education:

Games are thus the most efficient and time-honored vehicle for education. We don't see mother lions lecturing cubs at chalkboards. We don't see senior lions writing their memoirs for posterity. In light of this, the question, "can games have educational value?" becomes absurd. It is not games but schools that are the newfangled notion, the untested fad, the violators of tradition. (Chapter 2, para. 5)

For Group 1, the use of this quote seems to be an argument against criticism of gaming as something new that does not promote learning. In another location in their digital story, Group 1 asserted, "We believe by creating games, students learn science, technology, engineering, and math skills, as well as problem solving, critical thinking, language skills, and teamwork." Group 1 furthermore described gaming as "fun."

The topic of gaming also made a brief appearance in Group 3's digital stories. While Group 3 did not explicitly discuss gaming, in part of their explanation and promotion of Google Slides, they used an example of a slide from a Google Slides document with the title "Games in Education." The three bullet points for the slide were rationales for the use of gaming: the promotion of student "interaction"; that it "engages and motivates" students; and its ability to "introduce new worlds to students." Group 4, who promoted the use of AR games in their digital story, also pointed out how games can promote engagement and interaction. One example in their digital story was a murder mystery AR game called "Mentira" (<http://www.mentira.org/>), which they described. According to Group 4's narrator, Mentira "engages the students in an immersive and interactive language activity."

Theme 2: identity and roles. The second theme I identified in the participants' digital stories related to identity and roles. Implicitly or explicitly, the participants addressed their own identities and roles, and those of students, teachers, and other stakeholders, as they discussed ET-

related topics. One of the identities that at least four of the five narrators employed in the digital stories was that of *teacher*. For example, the narrator of Group 2's digital story, Participant 13, stated, "I am a 21st century teacher" while discussing the importance of educational technology implementation in K-12 education. At this time in the video, an image of a teacher from the cartoon series South Park appeared with the label "The 21C Teacher." Other narrators also employed first-person pronouns when discussing educators. The other narrator in Group 2, Participant 17, employed the first-person plural pronoun *we* when discussing how to open a new course page in an LMS, Canvas, to use in foreign language education: "we can create a course and get into the course." The narrator of Group 1 (Participant 3), who addressed how traditional L2 pedagogical methods often involve inauthentic language may not prepare students to communicate, also employed the first-person plural pronoun when she asked "So, how do we overcome this problem?" The narrator of Group 4 employed the same pronoun (*we*) when describing the plethora of ways to employ AR: "[t]he potential opportunities for AR use in the language classroom are as diverse as the languages we are excited to teach." While most of Group 3's digital story consisted of dramatizations, in at least one of the sections when the narrator directly addressed the audience, she also used the pronoun *we* when discussing how to employ Google Apps for instruction. Through explicit statements of their identities (e.g., Participant 13) and employing inclusive language such as *we*, the participants identified themselves as teachers. As the targeted audiences of the digital stories were L2 teachers undergoing professional development, the participants, intentionally or not, expressed a sense of shared identity with their targeted audience.

Duties and responsibilities. The digital storytelling groups also addressed issues related to the duties and responsibilities of teachers or other stakeholders. One of the responsibilities the

digital storytelling groups noted were the obligations of teachers to keep up with knowledge of educational technology and to employ educational technology in classes. For example, a narrator in Group 2's digital story (Participant 13) employed the following quote by Ray Clifford: "I believe it is important to remember technology won't replace teachers, but teachers who use technology will probably replace teachers who do not" (quoted in Healey et al., 2008, p. 2). These words, in written text form, appeared in the video at the same time (see Figure 12). As both the spoken and written text express the same meaning, this is another example of the digital storytelling groups' use of *ideational concurrence* (Unsworth, 2006). The narrator of Group 2's digital story (Participant 13) also criticized "school leaders" for failing to implement and employ educational technology that could help students. Conversely, she praised "new forward-thinking school leaders" who were about to introduce an LMS to her county school district.

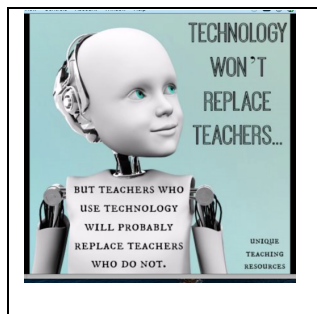


Figure 12. Teacher ET knowledge. With this image and quote by Ray Clifford (quoted in Healey et al., 2008, p. 2), Group 2 stressed the need for teachers to acquire knowledge about ET.

Teacher-centered versus student-centered education. Another issue the participants addressed in their digital stories was the roles of teachers and students relative to each other. In particular, Group 2 addressed notions of teacher- and student-centered classrooms. Figure 13 is an example of how they employed multimodal resources to accomplish this. One of the narrators in Group 2 (Participant 13) employed these images during a discussion of how the "innovative and bold changes" of implementing LMS in her school district will "simplify teaching and learning." The black-and-white image on the left appears to represent a traditional teaching

method from the past (or maybe even the present), while the color image on the right appears to be a more modern method that involves the use of computers. The student in the image on the left is facing the instructor and her/his body language suggests she/he may be frustrated with the learning exercise, which involves a chalkboard. In the image on the right, the students seem to be engrossed with something on their computer screens, and they are facing away from the teacher. The image on the left is suggestive of teacher-centered learning, while the image on the right suggests more of a student-centered approach to education. While Group 2's narrator did not explicitly state that changes coming to her county's school district were related to student-centered education, she did state that positive changes related to educational technology will occur in the near future. In multimodal data analysis terms, this scene in Group 2's digital story (Figure 13) is an example of *ideational complementarity*, in which the modalities express different meanings to contribute to one "overall meaning" (Unsworth, 2006, p. 62). As the spoken language (narration) points out that upcoming educational technology innovation will have a positive impact on Participant 13's school district, the images that appear at the same time (Figure 13) suggest that at least part of the improvement may involve education that is more student-centered in nature.



Figure 13. Impact of ET on teaching approaches. These images appeared in Group 2's digital story as the narrator discussed the impact of the implementation of LMS in her school district. The scene on the left is suggestive of teacher-centered education, while the one on the right is more suggestive of student-centered learning.

Theme 3: notions of change and adaptation. The third theme I identified in the DS+ was the notions of *change* and *adaptation*, particularly as they relate to educational technology. The participants made multiple references to rapid technology changes or innovation in their DS+. One example is from Group 4's DS+ in which the narrator described the growing number of AR tools available for L2 education: “[a]nd as you are watching this video, even right now, more innovative technologies are in production.” The digital storytelling groups also noted the changes that they believed needed to occur in teaching/learning approaches in L2 education. As I discussed above, in the first part of Group 2's digital story the narrator described that while her county school district had initially been reluctant to implement LMS, they had decided to begin to employ it in the near future. The narrator (Participant 13) noted that LMS would help teachers respond to “current and evolving teaching and learning needs.” She also discussed how educational technology had evolved over time, and how those changes have, or should, lead to changes in pedagogical practices. The images in Figure 13 suggest how technological changes, from chalkboards to computers, have accompanied the evolution from teacher-centered pedagogy to student-centered learning.

Group 1 also addressed the notion of change, albeit a negative one. In their digital story they promoted the use of games in education because *play* had been the way humanity has learned throughout much of its existence (Crawford, 2011). They employed a quote by Crawford (2011) to suggest that modern brick-and-mortar schools with teacher-centered classes are a relatively new development that goes against tradition (see Figure 14). In their digital story, Group 1 acknowledged technological innovation as a positive change, but viewed education without games as a new and negative development.

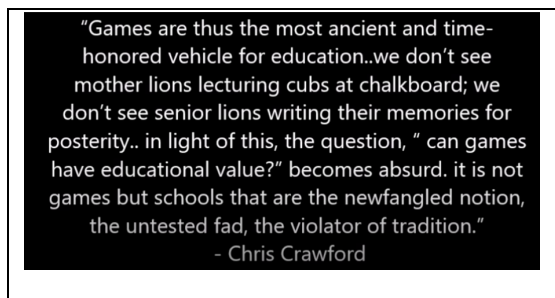


Figure 14. Learning through games. Group 1 asserted that games are the traditional way of learning.

Summary of Research Question 2 discoveries. In this section of Chapter 4, I described the discoveries for Research Question 2, which focused on the educational technology-related themes in the doctoral students' digital stories. I began this section with a brief description of each digital storytelling group and the contents of their digital stories. Employing Constant Comparative Methods (Corbin & Strauss, 2008) to inductively explore the data, and multimodal concepts from Unsworth's (2006) work on image-text relations to deductively explore them, I discovered three themes. The first one related to the participants' perceptions of the influence of educational technology on the processes, products, and learners in L2 education. These were the primary rationales for employing the types of educational technology the participants' promoted in their digital stories. The educational technologies they advocated were immersive technologies (AR and VR), Google Apps (Docs, Slides, Forms), LMS (e.g., Canvas), and educational games. Another theme in the digital stories involved the participants mentioning or discussing the identities and roles of themselves, students, and other stakeholders. The participants discussed how educational technology impacts, or should impact, these identities and roles, and noted it is the duty of educators to learn about and employ educational technology effectively with L2 students. The third major theme embedded in the digital stories related to the notions of *change* and *adaptation*. They perceived that rapid developments in educational technology correlate, or should correlate, with changes in the roles of students, teachers, and other stakeholders. The

digital storytelling groups also stated beliefs that recent technological innovations will, or should, lead to changes in pedagogical approaches and the adaptation of new technologies in L2 learning contexts.

Research Question 3: Doctoral Students' Experiences of a DS Project

In this section of Chapter 4, I delineate the findings for Research Question 3: *In what ways do the doctoral students experience a digital storytelling project?* As the participants' digital stories are about educational technology, and they employed digital technology to create their stories, I sought to answer this *a priori* question in the hopes that it may provide deeper insight into the participants' beliefs about educational technology use in L2 education. Furthermore, the discoveries of Research Question 3 may provide some evidence regarding whether multimodal projects such as digital stories may serve as a useful means to encourage doctoral students in the field of SLA to explore, negotiate, develop, and express their beliefs regarding the use of educational technology in L2 education. These types of projects may, in turn, provide educational researchers with access to insights about those beliefs and experiences.

To answer Research Question 3, I turned to all four of the primary data sets (digital stories, online asynchronous discussion threads, semi-structured interviews, digital survey), which makes it different from Research Questions 1 and 2, which only involved one data set each (the online asynchronous discussion threads and digital stories, respectively). However, while most of the participants contributed to three of the data sets (discussion threads, the groups' digital stories, surveys, semi-structured interviews), only seven randomly chosen participants took part in semi-structured interviews. Therefore, expressions of their experiences appear more frequently in the sum of the data than the other participants'. See Table 6 for a list of which participants provided data for each of the data sets.

The digital storytelling project was a core project of the six-week doctoral-level summer course on the uses of educational technology in second/foreign language education. The course syllabus indicated the project was collaborative and each group should include four members (University of South Florida, 2018). According to the course instructor, the participants had permission to choose the members of their own groups. However, Participant 17, a doctoral candidate who observed the course but did not enroll in it, joined two of the digital storytelling groups. He was a narrator in Group 2's digital story and an actor in Group 3's skits. The number of members who participated in each group is as follows: five in Group 1; four in Group 2; five in Group 3; and four in Group 4. See Table 9 and Table 13 for additional details on the digital story groups.

The context and purpose of the collaborative digital storytelling project was to create promotional videos which K–12 in-service or pre-service L2 teachers would watch before attending professional development training. The following text is the directions from the course syllabus (University of South Florida, 2018) explaining the digital storytelling project to the participants:

Digital Storytelling Project (40%) — The goal of this 4-member group-based project is to compile a 10-minute maximum tech-infused digital video story on the impact CALL/MALL technologies can have on SL/FL teaching and learning. The impact of tech materials should be described in a narrative storytelling style and may employ any and all selection of print/digital materials, including audio/video recordings, graphics, photographs, texts, and/or pictures. Think of your story as a targeted academic commercial to be used with clear intent in teacher professional development events. (p. 6)

Possible influences on DS experience-related data. Throughout the data there were many instances of the participants discussing or referring to their experiences with their digital storytelling project. However, before discuss the findings, it is necessary to mention factors which may have influenced how the participants portrayed their experience other than intrinsically motivated desires (Dörnyei, 1994) to engage in digital storytelling. To begin with, the relatively large impact the digital storytelling projects had upon the participants' grades (40% of the final grade) may have influenced how they depicted their experiences. In addition, the presence of semi-structured interview questions and digital survey items focusing on the participants' experiences with their digital storytelling projects may have influenced the quantity and quality of their discussions and portrayals of those experiences. Ten of the 33 items in the digital survey and five of the 11 questions in the semi-structured interview related to digital storytelling or similar topics. Table 14 and Table 15 list the survey items and semi-structured questions that focused on the participants' experiences with their digital storytelling project, related topics, or whose answers the digital storytelling project may have directly influenced.

Table 14

Digital Survey Items on DS Project Experiences

- (17) How was your experience making a digital story in your class?
- (18) What were the challenges you encountered while making your digital story?
- (19) What was easy about your digital storytelling project?
- (20) What did you enjoy about making your digital story?
- (21) What did you learn from your digital story experience?
- (22) Did your perception of educational technology change as a result of your digital storytelling project? If yes, in what ways did it change?
- (23) Would you be willing to engage in the holistic process of creating a digital story again? Why or why not?
- (24) Would you like to use digital storytelling with your current or future students? If yes, why would you like to use a digital storytelling project and how would you like to employ such a project?

Likert-Scale Items (5 strongly agree – 1 strongly disagree)

- (28) The digital storytelling project in FLE 7700 was enjoyable.
- (29) The digital storytelling project was difficult.

Table 15

Semi-Structured Interview Questions on DS Project Experiences

<p>(4) Before this class, did you have any experience making a digital story? If so, please tell me about it.</p> <p>(5) Before this class, did you have any experience creating or editing videos? If so, please tell me about it.</p> <p>(8) Please tell me about your experience making a digital story in this class.</p> <p>(9) What was your digital story about?</p> <p>(10) How did your experience creating a digital story, if at all, influence your opinions regarding the use of technology in second/foreign language education?</p>
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Discoveries for Research Question 3

Findings from explorations of the four primary data sets suggest the participants generally found their collaborative digital storytelling projects to be positive experiences in terms of the activities in which they engaged and how they perceived themselves to have benefitted from the project (e.g., knowledge gains, discovering a new learning/teaching activity). While the participants also noted some challenges they faced, the majority of their discussions and portrayals of their experiences focused on the positive aspects of the processes and outcomes. The three digital storytelling-related themes (Guest, MacQueen, & Namey, 2012) I identified in the data were

- positive project experiences with the digital storytelling project;
- outcomes and benefits from participating in the digital storytelling project; and
- challenges the participants faced during the project.

I discuss each of these in the following paragraphs.

Theme 1: positive project experiences. Most of the participants expressed generally positive perceptions of the digital storytelling project. The majority (e.g., Participants 2, 4, 5, 7, 9, 11, 13, 14, 15, 16, 17) indicated they found the project interesting, likeable, or enjoyable.

Among the words or phrases the participants employed to describe their digital storytelling project were “[r]ewarding” (Participant 5), “great experience” (Participants 7 and 16), and “fantastic” (Participant 14). Some participants employed multiple positive terms in their appraisals, such as Participant 2, who stated, “it was ... a really rewarding experience and fun at the same time.” The following summary of the project by Participant 12 echoes elements of other participants’ evaluations: “This project was creative and effective. It had served the purpose of us showcasing our knowledge of the field, technology, personalities, as well as being effective for a 6 weeks course.” These types of positive evaluations of the digital storytelling project experiences appeared frequently in the data sets.

In addition to indicating their digital storytelling experiences were positive, the participants also described what it was they liked about those experiences. However, I need to note that digital survey item #20 (see Table 14) asked them this very question: “What did you enjoy about making your digital story?” I also asked seven of the participants questions about their digital storytelling project in the semi-structured interviews (see Table 15). The participants may not have provided this information, at least in these data sets, had I not asked them these questions.

However, with that said, many of the answers about what they enjoyed involved different stages of the digital story production process. For example, for Participants 4, 6, 7, and 14, the design or creation phases of their videos were enjoyable. Later phases of production, particularly “editing,” was what Participant 5 enjoyed. Three of the other participants indicated they achieved satisfaction from the outcomes of their project: for Participant 15 it was “the final production”; for Participant 10 it was “learning a new skill”; and for Participant 8 it was her group’s

successful inclusion of humor in their story. Another outcome-related answer came from Participant 9, who liked the opportunity to create a “personalized” digital story.

Throughout much of the data the participants frequently mentioned or discussed their project mates or the collaborative nature of their digital storytelling experiences. However, before turning to a discussion of those experiences, I would note that many of the participants were familiar with each other before enrolling in the course. All of them were in the same doctoral program, and most of them were in either their first or second year in the program. Many of the participants had already taken courses together, and as relatively new students, they may have been aware that they would likely take more courses together following the conclusion of this course. An understanding that they were likely to become classmates again, perhaps multiple times, may have influenced how they portrayed the nature of the collaboration in their digital storytelling project.

However, with the context of the relationships among the participants in mind, the preponderance of the relevant data suggests that, although some of the participants found aspects of collaboration challenging, most or all of them generally liked their group work. Indeed, strong criticism of collaboration was absent in the data. Multiple participants (e.g., Participants 1, 2, 8, 13, 17) indicated the collaborative nature of the digital storytelling project was either enjoyable or interesting. As Participant 17 put it, “[i]t was an interesting experience, in particular working with my team members.”

Another positive aspect of their group work experiences involved sharing knowledge. For example, Participant 16 indicated she learned from her group mates, and Participant 2 liked that they could “share our knowledge and experiences.” Participant 17 stated, “I relish the opportunities of learning new things and insights from my peers.” In a discussion thread post,

Participant 5 thanked Participant 14 for introducing him to PowToon (PowToon Ltd., 2020), which was the tool Participant 14's group had employed to create their digital story.

Some of the participants noted that they liked being “able to divide the labor” and share their “strengths,” as Participant 8 put it. Participant 7, who was a group mate of hers, expressed similar views about the efficiency of their work: “[w]e collaborated well.” Another aspect of collaboration that Participant 8 liked was feeling a sense of responsibility to the group that motivated her to finish her work quickly and to create quality products.

While the vast majority of the participants' evaluations of their experiences were positive, some participants pointed out aspects of group work that could be challenging. Participant 16, for example, stated that “[c]ombining ideas and different expectations was a bit of a challenge but at [t]he end we got a very interesting digital story.” Participant 4 noted that the need to “divide what you have to do” could be difficult. Participant 17 stated that communication among group members and matching time schedules could cause challenges.

As the above examples illustrate, the participants had mostly positive perceptions of the collaborative nature of the digital storytelling project. None of the participants harshly criticized or disliked collaborating. While some of the participants felt there were some challenges with group work, most or all of them enjoyed the collaborative nature of their project. Some participants also credited group or class mates for what they had learned from their digital storytelling project. Furthermore, the participants had mostly positive views of their digital storytelling experiences, although they differed about what aspects of it were enjoyable or valuable.

Theme 2: outcomes and benefits of participation. Part of the discoveries for the first theme involving group work and collaboration involved the participants' recognition that they

had learned from group mates in their digital storytelling projects. In my description of the discoveries for the second theme, on the perceived benefits of participating in the DS projects, I focus on the participants' expressions of the contents of their learning, or what they learned in their digital storytelling projects. Multiple participants indicated they believed they benefitted from the project in various ways, including acquisition of experience, knowledge, and an understanding of a new project (i.e., digital storytelling) to use with their own future students. In the following paragraphs I describe how they perceived themselves to have benefitted from their digital storytelling projects.

The acquisition of knowledge about educational technology was, for the participants, one of the positive outcomes of participation in the digital storytelling project. Participant 11, for example, indicated she had learned about "AR and VR," of which she had little prior knowledge. Participants 5, 10, and 14 credited the digital storytelling project with increasing their familiarity with animation software called PowToon that people can employ to make digital stories. Participant 10 also credited the digital storytelling project for improving her knowledge of Audacity, an audio file editing tool, and generally found learning about educational technology a "rewarding" experience. Participant 16 noted the project improved her capabilities with a Learning Management System, Canvas. Participant 4 stated that she "learned how to combine audio, images etc. The creation in general of the story." Participant 1 learned about creating and editing digital stories. Participant 2 shared how taking part in the digital storytelling project influenced her beliefs about educational technology by stating that "I have a stronger believe [*sic*] now that any instructor can use educational technology in their classes." Participant 9 learned that she "like[s] using new technology" as a result of participating in the digital storytelling project. Furthermore, in addition to these various positive outcomes, the participants

liked and benefitted from sharing knowledge and learning from their project mates, which I described above in Theme 2 of Research Question 3's discoveries.

Some participants noted how their experiences with the digital storytelling project gave them ideas about how to improve their future teaching. They could use digital storytelling as a didactic tool to impart knowledge to their own students or have their students learn by creating their own digital stories. Participant 6, for example, indicated that through the digital storytelling project he learned an effective method of teaching and “a great way to connect our students to the world.” He extolled the benefits of these types of multimodal teaching thus:

teaching using video is an amusing experience for both teacher and students. Teachers who use video story telling save more time and explain more content than those who depend on their own voice or pictures to talk about some topics.

Participant 7 generally shared his views of digital storytelling, stating “Digital story [*sic*] should be used as an approach in presenting ideas in the classrooms.” Participant 2 indicated she “learned that this project can be helpful in different ways including enhancing collaborative work, developing the learners' speaking and writing skills, increasing the learners' motivation towards learning.” Participant 8 similarly noted how the digital storytelling project positively impacted her beliefs about teaching, stating, “I would try harder to create meaningful assignments, or meaningful projects, where ... my students can ... get involved in ... authentic input and ... purposeful output.” How to improve on future digital storytelling projects is something else Participant 8 learned from her experiences. For example, she discovered that for digital storytelling projects, “[p]lanning is really important and good-quality equipment will make me shine.” Participant 13 learned learned from the digital storytelling project that “[i]t is vital for the next generation of teaching to include educational technology in instruction.” As

these examples illustrate, the participants indicated they benefitted in multiple ways from their digital storytelling experiences.

Theme 3: challenges faced. Although the majority of the participants stated their digital storytelling experiences were positive, some of them also pointed out challenges they faced. However, as the digital survey and the semi-structured interviews included questions about what the participants believed to be challenging in their digital storytelling project (see Table 14 and Table 15), the participants may have focused more on on this topic than they would have if I had not asked these questions. With that in mind, in the following paragraphs I delineate the challenges the participants faced during their digital storytelling production processes.

For some participants, unfamiliarity with the tools they employed to create and edit their digital stories was a challenge. For Participants 4, 5, 9, 10, and 14, unfamiliarity with software or learning about software was a challenge. Participant 14 addressed this issue, stating, “[i]t was a real challenge designing 8 minutes of advertising video in a program that I used for the second time and in a limited period of time.”

Acquiring resources also challenged some of the participants. Participant 1, for example, cited “cost of some editing tools” as a challenge, and Participant 8 said she discovered after recording their video that their lack of “professional-quality equipment” left them with poor quality “audio input.” Participant 4 also cited poor quality equipment as a challenge. For Participant 14, a challenge was “[f]inding the correct images and citing them in the video to avoid copyright issues.”

While most of the participants had positive views of collaborating, some noted that working together could also involve some challenges. As I discussed this topic in the discoveries for Theme 2, which related to group work and collaboration, I only address it briefly here.

Participant 16 stated that “[a]s most of group projects, coordination and timing finalizing the project was a little stressful. Combining ideas and different expectations was a bit of a challenge but at [t]he end we got a very interesting digital story.” Participant 17 expressed similar views: “I think the communication and time schedule among my team can be a challenge. So sometimes we were not able to be on the same page.”

The participants also cited multiple other challenges. For Participant 5, “[f]ilming and sound recording, editing” were among the challenges, while Participant 15 thought creating a digital story “both fun and engaging to watch” could be a challenge. For Participant 2, challenges included the earlier stages of the project, such as choosing software and developing “the initial idea” for their group’s story. Time management was a challenge for Participant 7.

As the above examples demonstrate, the participants faced challenges during the digital story creation process. The challenges they faced included acquiring resources, unfamiliarity with technology, finding materials, and coordinating group efforts. However, these challenges did not lead any of the participants to conclude that their overall experiences were negative.

Summary of Research Question 3. The participants described their collaborative digital story experiences in different terms, but for most or all of them it was an interesting, enjoyable, and/or beneficial experience. Terms they employed to describe the digital storytelling processes included *fun*, *rewarding*, *interesting*, and *proud*. The participants also indicated overall satisfaction with collaboration and largely felt it to have been beneficial. Some even thanked their group mates directly in the discussion threads. Although some participants cited challenges they faced, none of them held overly negative views of their experiences. To the contrary, they indicated multiple ways in which they benefitted from their digital storytelling experiences.

Research Question 4: Doctoral Students' Perceptions of ET

Research Question 4 asks, *How do the doctoral students perceive the use of educational technology in second/foreign language education?* To a degree, this last of the *a priori* research questions represents a synthesis of the other three research questions because it involves all four primary data sets (online asynchronous discussion threads, digital stories, digital survey, semi-structured interviews) and because the main purpose for conducting this dissertation was to explore the participants' beliefs regarding educational technology. The use of all the data sets differentiates Research Question 4, along with Research Question 3, from Research Questions 1 and 2, whose discoveries involved only one data set each (the online asynchronous discussion threads and collaborative digital stories, respectively). For Research Question 4, the four data sets enabled in-depth explorations of the participants' beliefs regarding the use of educational technology in L2 education.

The participants, perhaps unsurprisingly, expressed a wide variety of perceptions regarding the use of educational technology in L2 education. However, through a rigorous process of Constant Comparative Methods coding (Corbin & Strauss, 2008), I was able to categorize their perceptions into three overarching categories. These perceptions focus on

1. rationales for ET implementation and use;
2. specific types of educational technology and their characteristics; and
3. the ET-related knowledge of the participants and other educators.

I discuss each of these perceptions individually in the following sections.

Rationales for ET implementation and employment. Many of the participants' discussions throughout the data focused on the implementation and employment of educational technology in L2 teaching and learning. In this section, I discuss the participants' perceptions of

rationales for ET implementation and use. However, I could further divide these perceptions into two related sub-categories of perceptions. The first sub-category involves participants' beliefs and arguments that educators should base their decisions regarding educational technology implementation and employment on sound reasoning. The second sub-category involves the participants' ET-related perceptions of the dynamics among L2 learners, learning processes, and learning outcomes, which served as rationales for employing, or not employing, educational technology. I discuss the discoveries for these perceptions in the following paragraphs.

Making decisions regarding ET implementation and use. Throughout much of the data, the participants discussed the rationales for teachers' decisions whether or not to employ educational technology and what types of educational technology to choose if they decided to use it. These discussions of rationales also involved what the participants perceived as the potential *pros* and *cons* of educational technology. I discuss these perceptions in the following paragraphs.

The majority of the participants (e.g., Participants 2, 4, 7, 8, 9, 13, 14, 15, 16) stressed that ET use should be purposeful, and that choices and decisions about ET's implementation and employment require critical thought. For example, Participant 14 asked, “[w]hy we are adopting it? and What benefit it will add to our teaching?” Participant 2 put forth issues to consider: “As educators, the first thing we need think of before implementing any technology in our classrooms is if the tool we are using is helpful in developing the learners' skills.” Participant 10 narrowed the criteria for choosing a type of technology to those that will have the most positive impact on “learning outcomes.” Participant 15 stressed the need to examine educational technology from different angles before adopting it:

The enthusiasts would strongly support the integration of technology into the classroom teaching and learning, but the conservatives would point out the shortcomings. I think it's good to have both of them, because they help us critically examine the feature of the targeted technology, and can also help us decide whether to adopt it or not in a wise way.

Participant 5 shared their beliefs about focusing on learner outcomes and recognizing potential *cons* when choosing a type of educational technology, but he also noted that understanding “our own skills in utilizing said tool” was important, particularly in the context of protecting learner privacy and safety. As these examples illustrate, multiple participants stressed that decisions about implementing and using educational technology required critical thought.

Some participants cautioned against becoming “swept up” by trends in educational technology when making decisions about its implementation or use. Participant 5, for example, warned about choosing ET for the wrong reasons:

Yet, in this age of information and technology, it is easy to get tangled up with the web of grandeur and illusion, failed to look past the bells and whistles technology has to offer, and ended up chasing the red herring of the latest and greatest.

Participant 1 shared his views: “The emerge [*sic*] of creative and new technologies in last decade motivate [*sic*] teachers to jump [to] using them without reviewing or modifying to meet the needs of FLA and SLA culturally diverse classroom.” Participant 16 expressed similar concerns about ET-related decisions lacking purpose or critical thought: “It can not be based on other teachers' preference or the latest ‘thing’ on the market, but it has to be the tool that will really align with the curriculum and the objectives of the lesson.” Participant 3 also warned against chasing fads:

The digital storytelling document made it clear that with any new advance creation or technology we all tend [*sic*] to flock to or like to overuse. This make me contemplate [*sic*] how technology nowadays is being used in our personal life and how it is making way into the classroom. This is both exhilarating and frightening to me. Exhilarating because this means that there are a lot of open minded people out there, and frightening because it could also mean that some might just be following everyone else and not really thinking for themselves, and/or that we are just moving so fast we have not time to truly examine how this will affect our future.

Multiple participants warned about overvaluing the role of educational technology in L2 learning. Or, as Participants 4, 5, and 15 (among others) cautioned, educational technology is not, in their words, a “panacea.” Other participants expressed similar beliefs, such as Participant 9, who advised that “we also keep a discerning eye on those who place too much value on the use of the technology alone.” These types of arguments were among those supporting the rational use of educational technology in L2 education.

In addition to concerns about overvaluing the use of educational technology, or implementing it for the wrong reasons, some participants warned that the employment of educational technology could even become a distraction or hindrance to learning. One example is Participant 16, who stated,

I think that it depends of the purpose for what we are using a tool in a specific moment or topic, because in my opinion, technology itself will not make the difference but the use and function that us, as instructors will give it in the classroom. Otherwise, I think they will be a distraction from the learning process.

Participant 1 expressed similar concerns about educational technology, and Participant 10, who promoted the use of gaming, cautioned that teachers should not use it in ways that interfere with learning. Participant 5 also advised educators to consider multiple ET-related factors to avoid the use of ET hardware or software hindering with learning. The factors Participant 5 pointed out involved concerns about the amount of time it could require for students to learn how to employ educational technology, along with concerns about financial costs, including electricity, internet service, and software.

Multiple participants (e.g., Participants 2, 5, 10, 16), who argued that the implementation and use of educational technology should be purposeful, cited the instructor and course readings (e.g., Chapelle, 1998; Lontas, 2001b, 2018b) in support of their beliefs. Among the many examples is a succinct statement by Participant 2 that “[a]s [the course instructor] mentioned, there should be a purpose for the use of technology.” Participant 5 similarly posted in the discussion threads that the course instructor had advised them that “implementations of technology in language classrooms *should always be done with a purpose and for a purpose*” (emphasis in original).

The participants also cited the instructor and course materials when discussing specific rationales and outcomes related to the implementation and use of educational technology in L2 education. For example, Participant 16 stated that “[a]s we learn[ed] in this course, when use it [*sic*] for a specific objective, digital technology will increase learners' engagement and motivation and will change the language learning experience for our students.” Participant 7, discussing articles by the course instructor (Lontas, 2018a, 2018b), noted that “language and cultural proficiency” will improve with purposeful educational technology use. Participant 15 employed a quote from an article by the course instructor (Lontas, 2018b) that stated “the

decision to *use* or *not use* a particular technology, tool, or resource should never rest on what others say or do, but on the promise the targeted technology holds for language teaching and learning” (emphasis in original) (p. 40).

As the examples above suggest, most or all of the participants expressed beliefs that educational technology use should be purposeful. They argued against using educational technology just for the sake of using it or because it was a fad. Many of the participants cited the instructor and materials from the course (e.g., Chapelle, 1998; Lontas, 2001b, 2018a, 2018b) to support their claims about the need to have learning goals in mind when implementing and employing educational technology.

L2 learners, learning outcomes, and learning processes. The participants’ discussions of rationales for educational technology use included ET-related beliefs regarding the dynamics among L2 learners, learning processes, and learning outcomes. While some of their expressed beliefs involved perceptions of broad, general learning, such as academic achievement, other comments focused on more specific areas of improvement, such as learner motivation, engagement, or learning the target language and its culture. The participants discussed these issues in relation to how they impacted L2 learners, including individual students with varying personal characteristics (e.g., learning wants or needs). Perceptions of the positive impact of educational technology use on L2 education additionally served as the participants’ rationales for decisions regarding ET use and implementation. I describe these learning- and learner-focused discoveries in the following paragraphs.

The participants frequently discussed the importance of making decisions about educational technology based on understandings of individual learners. Participant 12, for example, pointed out the value of this knowledge: “learner’s differences have a huge impact on

the effectiveness of a multimedia tool in the class. In short, I will learn my audience before creating/choosing my material.” Participant 13, who cited Lontas (2006), expressed similar views. Participant 15, who shared their beliefs, noted that knowledge about specific learner characteristics would aid the effective employment of educational games: “teachers need to take learners’ individual personality, intelligence, aptitude, and learning style into account.”

Participant 9, however, while agreeing with classmates about the usefulness of differentiated learning, noted that it was a challenge to develop materials for every learner’s needs.

The general consensus among most or all of the participants was that educational technology could have a broad, positive impact on learner outcomes. Participant 14, for example, indicated she believed educational games were an efficient means to achieve learning goals. Another example is a post by Participant 1, who stated, “[i]n 2018, using technology in today classroom become [*sic*] necessary not because learners like it, but because of its positive impact on students learning outcomes.” Throughout this dissertation’s data, multiple participants such as these expressed beliefs that educational technology could have a positive influence on learner outcomes in general.

In addition to its general impact on L2 learning, the participants also frequently noted more specific ways in which educational technology might improve L2 education. For example, the participants frequently stated that educational technology could provide opportunities for language input, output, and interaction. Some of the participants also stressed that ET-enhanced language experiences could involve authentic language, culture, and interaction. One example is Participant 5, who borrowed quotes from Lontas (2018c), “*Language input is critical...*” and “*Language practice is paramount...*” (emphasis in original) (p. 80), to emphasize the importance of experiencing and employing language. Another example is Participant 8, who pointed out how

games could provide context that supports “comprehensible input” and interaction within learning experiences focusing on meaningful communication. She also believed the multimodal nature of immersive learning activities could help learners comprehend input. Participant 1 expressed similar beliefs about games, noting that the type of input they offer, which involves active participation and observation, is preferable to “just being told about it.” Yet another example of these perceptions comes from Participant 15, who noted that AI and VR have the potential to immerse learners in authentic culture and meaningful communication that contextualize their learning.

The participants also expressed beliefs that educational technology may have an impact on other aspects of learning, such as engagement, motivation, and acquisition of the target culture and language. One example is a discussion thread post by Participant 3, who stressed that educators need to consider the *pros* and *cons* of “AI or new technology” in order to ensure they “will lead to students’ academic success and aids in developing students [*sic*] linguistics knowledge.” Participant 2 expressed similar beliefs in the digital survey: “I believe in the power of technology in facilitating the acquisition of the target language.” Some perceptions about language acquisition were even more specific, with one example being a discussion thread post by Participant 5, who pointed out how the multimodal affordances of multimedia “can help students understand origins of memorable phrase as well as their meaning and improve retention rate.” Other specific examples of ET-related learning outcomes the participants pointed out included critical thinking (e.g., Participant 3), vocabulary (e.g., Participant 16), speaking (e.g., Participant 3), and fluency (e.g., Participant 16).

The positive impact of educational technology on motivation was another perception many of the participants held. Examples of expressions of this belief appeared in Group 4’s

digital story, wherein the members stressed that technology, and its influence on motivation, can positively influence learning achievement. Over two scenes in their digital story (see Figure 15), the narrator (Participant 10) promoted the use of educational technology in order to increase motivation, which in turn improves academic achievement:

So how can this amazing technology be used in the language classroom? And why should we put in the effort to find out? Research has found that technology integration is useful in stimulating learners' motivation. Increased motivation positively impacts academic achievement, and if the students are engaged in interacting with other learners, they are likely to remember more, ask more questions, and think critically about the lessons.

The narrator, Participant 10, also pointed to the role of educational technology in promoting motivation in her Week 6 post in the discussion thread.

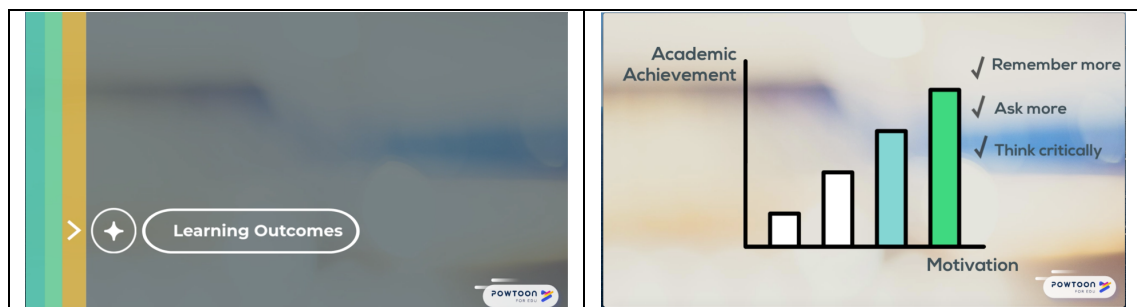


Figure 15. Motivation and academic achievement. In their digital story, Group 4 stated that learning outcomes correlate positively with motivation, which technology can promote.

In the scenes in Figure 15, Group 4 employed multiple modalities to express beliefs that educational technology can have a positive impact on learning outcomes. They employed *ideational concurrence* (Unsworth, 2006) by using three different modalities, narration, on-screen written text, and an image (i.e., the bar chart), to express the impact ET-enhanced motivation can have on students: “remember more,” “ask more,” and “think critically.” The bar chart in the scene in Figure 15, which employs both written language and images, suggests motivation correlates positively with academic achievement. Employing multiple semiotic

systems, Group 4 expressed a belief that technology use increases motivation, which, in turn, improves learning outcomes. This is one of many examples of the participants expressing beliefs that educational technology, in general, can have a positive impact on learning outcomes.

In this first section of Research Question 4, I described the discoveries related to the participants' perceptions of rationales for the implementation and employment of educational technology. One major category of these perceptions were beliefs that educators should have sound reasons for their decisions regarding ET implementation and use. The other major category of these perceptions involved ET-related beliefs regarding the dynamics among L2 learners, learning processes, and learning outcomes. These beliefs focused primarily on how educational technology could meet individual learners' needs and enable the effective and efficient acquisition of the target language. The participants frequently discussed the *pros* and *cons* of educational technology, with the former serving as rationales for its implementation and use.

Specific types of educational technology and their characteristics. The previous section of Research Question 4 included discoveries related to the participants' perceptions of rationales for educational technology implementation and use. Their rationales for ET use included what they generally perceived the *pros* of educational technology to be. However, in this section of Research Question 4, I focus on the perceptions or beliefs the participants expressed in the four data sets (discussion threads, digital stories, survey, interviews) regarding specific types of educational technology. The reason I separated discussions of findings regarding general ET beliefs and perceptions of specific types of ET is that the latter occupied a fairly large proportion of the data, and the participants expressed nuanced perceptions for each particular technology type. The types of technology the participants primarily focused on were

AI, annotations (e.g., glosses), AR and VR, CAT, educational games, Google Apps, and LMS. While the participants occasionally grouped some of these tools together in their discussions, particularly AI, AR, and VR, their opinions about their education potential frequently varied according to the type of technology. Therefore, in this section of the findings for Research Question 4, I discuss most of the technologies listed above individually.

Artificial Intelligence. Artificial Intelligence (AI) was a frequent subject of discussion in the data sets. The AI-related topics were wide-ranging and included personal interest in or experience employing AI; promoting, adopting, and/or critically evaluating the use of AI; learner engagement and different affective factors related to AI and its use (e.g., motivation, emotions); and AI's potential impact on learning. I discuss each of these in the following paragraphs.

Most of the discussions and comments about AI were positive in nature. For example, Participant 2 stated she was “intrigued to learn about AI” in the discussion threads, and expressed an interest in AI in both the semi-structured interview and digital survey. Participant 15 also posted she was interested in employing AI in the future. Participant 7, who also showed interest in AI, reported actual experiences employing it to make daily life activities easier (e.g., memos to herself, verbally drafting and sending text messages). However, while the majority of the participants' perceptions of AI were positive, Participant 3 did not share their optimism at the outset of the course. She admitted in discussion thread posts that she had initially feared AI, but her classmates' posts had led her to come to see the *pros* of AI as well as its *cons*.

Multiple participants advocated the use of AI in L2 education. Participant 13, for example, stated, “As we experience Web 2.0 technologies, it is time to move on, into the 21st century of Web 3.0 artificial intelligences (AI) and beyond.” Participant 12 believed that technology like AI, along with assessment technology such as CAT, is suitable for today's tech-

savvy learners: “In my opinion, combining the knowledge of CATs and AI when testing and creating language activities and tests is necessary especially when aiming at establishing a learning setting that fits our *digital students*” (emphasis in original). However, the participants also called for critical thought regarding the implementation and use of AI. For example, Participant 14, with TESOL’s 6 Principles (TESOL International Association, 2019) in mind, noted that the conditions of any particular learning situation may determine how to employ AI: “teachers should consider the context where they are teaching first, then decide whether [*sic*] to integrate advanced or beginner AI.” Following this statement, she contrasted the feasibility of educational technology use in the US and Third World contexts.

Multiple participants expressed beliefs regarding types of affect (e.g., emotions, motivation) they or L2 learners may experience when employing AI. Participant 15, for example, stated that “As for AI, it’s [*sic*] power is indeed very terrifying in the movies, such as the Terminator series, when the Skynet, the highly advanced AI, becomes self-aware, and sees humanity as a threat to its existence.” However, Participant 7 expressed more positive views of this technology: “AI in a second/foreign language learning could also be fun and engaging.” Comments about the impact various technologies, including AI, could have on learner motivation appeared frequently throughout the data.

Some of the participants expressed beliefs that AI could have a positive impact on aspects of L2 education other than learner affect. Or, as Participant 15 put it, “AI could offer great help in language teaching and learning.” Participant 8, for example, who valued the pedagogical potential of AI, noted it could serve to assess learner output and provide immediate feedback. Participant 3 saw similar value in AI as a means of reducing learners’ errors with language. Participant 9 noted the potential for AI to assist individual learners by presenting information in

different modalities: “Incorporating AI into the classroom provides each learner with a mode that allows them to learn best.” Many participants also discussed the potential role AI could play in developing L2 learners’ competence with idiomatic language (i.e., natural language) and cited the course instructor or a course reading (e.g., Lontas, 2006) to support their beliefs. A post by Participant 15 summarized her beliefs regarding the potential of AI with the following list of its capabilities: “for error correction, more accurate assessment of students’ abilities (Dunkel, 1999), foster knowledge of idiomaticity (Lontas, 2006), enhance L2 learners’ pragmatic competence, and even become learners’ personal language tutor through man-machine conversations and promote all facets of language skills.” However, she also cautioned there was a need to be aware of AI’s potential *cons* in order to be able to employ it effectively. In conclusion, as Participant 15’s and her classmates’ examples indicate, the participants generally believed AI could have a positive impact on various aspects of L2 education.

Immersive technologies: AR and VR. Expressions of beliefs about immersive technologies, Augmented Reality (AR) and Virtual Reality (VR), appeared frequently in the four main data sets. Among the reasons for this are that Group 4 focused primarily on AR in their digital story, and Group 1 discussed both AR and VR in theirs. In addition to these, some of the participants mentioned or discussed these technologies in the online asynchronous discussions, semi-structured interviews, and/or the digital survey. Throughout the data, I could identify multiple categories of beliefs the participants expressed regarding AR and VR, which the participants frequently discussed together. In order to avoid redundancy, I include both AR and VR in this section of the discoveries. The three primary categories of participant beliefs related to personal engagement with AR and/or VR, the potential impact of AR and VR on L2

education, and potential cons or challenges of immersive technologies. In the following paragraphs I address these three categories, along with their sub-categories, individually.

Personal engagement with AR and VR. Throughout the four data sets, multiple participants expressed interest in or experience with AR and/or VR. Some participants also stated plans to employ or research one or both of these immersive technologies in the future. In the digital survey, 8 of the 14 respondents (Participants 1, 2, 6, 7, 8, 9, 10, 15) indicated AR and/or VR were types of educational technology they wanted to “learn more about or employ in your future teaching.” Examples of more detailed survey answers about these technologies include those of Participant 7, who indicated she had experience teaching with AR and “would like to explore the use of AR and VR in the classrooms.” Two of the digital stories expressed participants’ beliefs regarding AR and VR: Group 4’s digital story focused exclusively on AR and Group 1’s included discussions of both AR and VR. Posts in the asynchronous asynchronous discussion threads also indicated the participants had interests in AR or VR. One example was by Participant 12, who stated, “mobile apps for VR and AR are very interesting.” In the semi-structured interviews, two of the participants discussed their AR- or VR-related perceptions or experiences. One of them, Participant 7, described a frustrating experience she had attempting to get an AR trigger to work. The other, Participant 2, related that she “did a lot of fun things” when working with an AR app and expressed an interest in focusing on AR in her dissertation. In the digital survey, Participant 9 showed an interest in using AR for teaching: “I would like to use AR to help students have a more authentic and realistic experience.” As these comments and statements attest, many of the participants expressed personal interest in these immersive technologies.

Potential impact of AR and VR in L2 education. Multiple participants expressed beliefs regarding the potential impact of AR and VR in L2 education. The beliefs they primarily discussed related to learner motivation and engagement with learning activities; engagement with/in the language or culture; learning outcomes; and potential challenges with AR employment. I discuss the discoveries for each of these in the following paragraphs.

Multiple participants explicitly or implicitly stated heightened learner motivation or engagement was a reason to employ AR or VR in L2 learning contexts. For example, in their digital story on AR, Group 4 stated, “[r]esearch has found that technology integration is useful in stimulating learners’ motivation.” Group 4 also embedded a promotional video for an AR tool, Google Expeditions (Google, 2017), in their digital story. This video included multiple scenes of elementary school students excitedly employing AR in science classes, which implied AR can motivate and engage students. The main focus of the participants’ beliefs about VR was that it provides motivational and engaging opportunities for learners to immerse themselves in authentic(-like) input (linguistic, cultural, and content knowledge) and engage in authentic(-like) interaction. One example is Group 1’s digital story, in which they showed an image of a person wearing what appeared to be VR goggles. The appearance of the person in Figure 16, who seemed to be smiling or laughing, suggests that the VR experience was enjoyable and engaging. In addition, the body language of the child in in Figure 7, who I described earlier, suggests similar meaning.



Figure 16. VR, motivation, and engagement. The person’s facial expression suggests VR can be motivational and engaging for students.

Among the participants' stated rationales for wanting to employ or research AR or VR in L2 education were beliefs that they could enable immersive learning experiences in which L2 learners engage (e.g., input, output, interaction) *with* or *in* authentic(-like) language and culture. For example, the narrator (Participant 10) of Group 4's video stated that, "Google Expedition [an AR tool] can be utilized to introduce places, enabling users to create authentic content focused on historical or cultural contents in the target language." Other participants who expressed similar views included Participant 2, who valued VR for its "authenticity and immersion features," and Participant 6, who believed AR and VR can "immerse them [students] in that culture." Participants 1 and 15, among others, similarly advocated the use of VR because it enables authentic encounters *in* the target language and *with* the target language. Group 4, in their digital story, promoted AR for its ability to provide multimodal content: "Why just read a book in class when you can make the story jump off of the page and into the classroom?" For Participant 12, another advantage of AR was that it allows students "to repeat the educational video as many times as they want!" An ability to concentrate learners' attention on linguistic content was another advantage of VR that Participant 9 cited.

Some participants also expressed beliefs regarding potential learning outcomes AR or VR may enable. Participant 9, for example, indicated that although she frequently saw advertisements for AR use in science curriculum, she believed learning outcomes for language learners would also benefit. Participant 8 pointed to the potential role of a VR game, Mission US (Thirteen Productions LLC, 2018), as a means for "[c]ontent-based learning" in which ESL students learn "cultural and social dynamics." Participant 1, who agreed with her, also pointed to the ability of VR to help with assessment of authentic interactions. Other learning outcomes participants identified included improved listening and communication competence, which were,

according to Group 4's digital story, potential benefits of using an Italian language AR tool. Group 2, in their digital story, pointed to research supporting a claim that the use of "virtual motion" can improve the retention of "action words." As these examples illustrate, multiple participants believed the use of AR or VR could result in specific types of learner outcomes.

Potential cons or challenges of AR and VR use. While most of the participants had positive perceptions of AR and/or VR, some of them pointed out potential challenges or drawbacks related to the use of these immersive technologies. For example, although Participant 7 had a generally favorable view of AR, she shared an experience in which learners had difficulty getting an AR trigger to work. Participant 2, who indicated she had an interest in conducting her dissertation research on AR, foresaw technical issues as a potential challenge. However, while some participants expressed concerns about AR or VR, the majority of the perceptions the participants expressed regarding AR or VR were positive in nature.

Computer-Adaptive Testing. Most or all of the participants' discussions of computer-adaptive testing (CAT) appeared in the discussion blogs; the topic appeared to be absent, or nearly absent, from the three other main data sets (digital survey, semi-structured interview, digital stories). While the participants' expressed a variety of beliefs regarding CAT, I was able to organize them into two categories: *pros* and *cons*. I discuss the discoveries for these categories in the following paragraphs.

Pros of CAT. Multiple participants cited the advantages of employing CAT in L2 education. Participant 13 offered the following list of pros that serves to summarize other participants' beliefs: "self-pacing; challenge; immediate feedback; improved test security; and multimedia presentations." Participant 8 expressed similar views, citing CAT's abilities to match "the test-takers' proficiency level and pace" and "to provide immediate feedback" as strengths.

Participant 7, who shared positive experiences employing CAT, perceived the latter strength as a “convenience.” Other positive perceptions of CAT included Participant 12’s belief that technologies such as CAT and AI are appropriate fits for today’s “*digital students*,” and Participant 8’s and Participant 12’s views that CAT can enable multimodal test items. Focusing on test validity, Participants 8 and 13 perceived the adaptiveness of CAT as making it particularly suitable for determining individual students’ abilities. In addition to these beliefs, Participant 3, who saw advantages to both CAT and paper-and-pencil tests, noted that the former allows students to answer “one question at a time, rather than be distracted with the whole concept of how many pages you need to answer.” The participants, as these examples attest, stated various positive beliefs about the use of CAT in L2 education.

Cons of CAT. While many participants believed CAT can make positive contributions to L2 education, some also discussed possible *cons*. The issues they raised included concerns about validity, technology-related issues, and the potential for stakeholders’ to over rely on assessment results. I address each of these concerns in the following paragraphs.

Some of the participants indicated they were concerned about whether or not CAT could provide valid or reliable assessment results. Participant 1, for example, questioned whether we should consider CAT to be an always reliable assessment of learners: “Another issue is measuring students’ performance in language mainly in computer test CAT. This seems to hold assumption about students experience and ability of transforming knowledge through devices or computer accurately.” Participant 8 also shared her concerns about validity and reliability, and cautioned not to overlook other means of comprehensive assessment.

Issues related to CAT software or hardware were other potential *cons* the participants discussed. For example, Participant 12 noted that “it has some downfalls such as technical issues

that may end a test unexpectedly or the inability to record a students' [*sic*] answers accurately." Another issue related to CAT technology was test anxiety. For example, Participant 7, who described experience administering CAT, noted that test-taker anxiety was an issue, and that she had students who "refused to use it." Participant 5 also shared her concerns about technology-related test anxiety.

Yet another issue involving CAT technology the participants discussed was students' ability to employ the hardware or software effectively. For example, Participant 8 warned that "the interface should not act as a nuisance and interfere with the students' performance." Participant 16, in a discussion of an article by Dunkel (1999) on CAT, also voiced concerns about the ways in which learner differences and differences in skill levels may lead to assessment results that are less than trustworthy: "Cultural, financial and social differences can make test results not [an accurate] and clear representation of language learners knowledge, if learners do not have all the necessary skills to successfully complete a CAT." Participant 4, also discussing the Dunkel (1999) article, indicated a concern about how CAT design, including technical aspects, could impact "the validity, consistency, and usefulness of L2 CATs." In addition to the participants' beliefs about CAT, Participant 7's actual experience administering one, which I mentioned in the paragraph above, "was challenging because some of the immigrant/refugee students did not have the digital literacy skills," she attested. While many of these concerns involved the validity or feasibility of CAT, Participant 3 thought another potential negative outcome of employing CAT could be "taking away from their [students'] skill to hone their writing skills when using pencil/pen and paper."

Other of the participants' validity-related concerns about CAT were the potential for educators or other stakeholders to over-rely on test results alone when making decisions about

students. For example, Participant 7, who addressed Dunkel's (1999) article but spoke from personal experience with CAT (as mentioned above), noted that educators or other stakeholders should, in addition to CAT scores, employ other testing data and resources, such as interviews and language standards, to ensure the validity of assessments. She also cautioned that effective use of CAT, along with AI, depends on the "sensitivity and flexibility" of instructors.

Participants 1 and 8 expressed similar concerns about relying solely upon CAT for accurate assessments, with the latter stating, "However, we should not get too excited and disregard the global qualities of assessment." Participant 10 similarly warned that "[s]cores of CAT for example, without reviewing the content and criterion validity, and without knowing the student, could be severely misleading."

Discussions of CAT appeared primarily in the online asynchronous discussion threads. The participants' beliefs regarding the use of CAT in L2 education were both positive and negative. Among the perceived pros were its adaptability, ability to provide immediate feedback, and capacity for employing multimodal test material. Potential CAT *cons* the participants identified included concerns about its validity, the challenges or negative impact of employing CAT technology, and the danger of over relying on CAT results. These were all issues the participants suggested to keep in mind when making decisions about implementing and employing CAT technology.

Educational games. Expressions of beliefs regarding educational games or gamification appeared frequently in the four primary data sets. Multiple participants showed interest in these topics, which the quotes from the data below attest. I was able to organize the findings into three categories: (1) the need for critical thought regarding game use, (2) the *pros* and *cons* of gaming, and (3) the participants' personal interests in and/or experiences with gaming. However,

connections exist among these categories. In particular, that critical thought results in identification of the *pros* and *cons* of gaming, the former of which serve as both rationales for the use of gaming and reasons for the participants' interest in it. The following paragraphs consist of descriptions of the participants' gaming-related beliefs and examples from the data illustrating them. However, before addressing the discoveries, however, I would point out that there may have been multiple influences upon the participants' gaming-related discussions. In particular, at least one of the course readings, Lontas (2016), focused on the use of gaming in education. In addition, the course instructor's prompt for Week 5's online asynchronous discussion directed the participants to discuss gaming in education.

Need for critical thought regarding rationales and purposes of games. Many of the beliefs the participants expressed regarding gaming in education consisted of calls for reasoning and critical thought to inform game-related decisions (e.g., whether to use or not), game-related choices (e.g., which games to use), how to employ games, and game design. After first discussing these topics in the following paragraphs, I then describe the participants' specific rationales for game use in the section on the *pros* of gaming.

Multiple participants believed that gaming implementation and use should have a purpose, and that educators should identify the role gaming plays in learning. They also believed that critical thought should inform decisions regarding game use. The following succinct quote by Participant 10 generally represents views many of her classmates expressed: “[t]he critical point, here, is deciding and planning when, how, and why to include them.” Participant 15 also believed that game use must be purposeful: “gaming activities need to correlate closely with the language goals, or else there is no need for employing games in the language classrooms.” Participants 2 and 3 were among the participants who shared her belief that learning goals should

direct game choice. In addition, game use devoid of purpose, according to Participant 1, would merely serve as a temporary means to prevent learners from “feeling bored.” As support for these types of views, that gaming use should be purposeful, multiple participants (e.g., Participants 2, 3, 5, 10, 13, 15) cited an article by the course instructor (Liontas, 2016).

Pros of gaming. The statement “games are great for educational purposes,” which was part of a discussion post by Participant 7, is representative of the beliefs many participants expressed. A succinct list of the reasons for their perceived greatness, which many participants expressed in whole or part throughout the four sets of data, appeared in a scene in Group 3’s digital story. In this scene, which was a demonstration of the collaborative functions of Google Slides, Group 3’s participants typed the following game-related texts into a document (see Figure 17):

“Games in Education

- Games promote interaction among students.
- Gamification engages and motivates. (Participant 7)
- They introduce new worlds to students. (Participant 8)”

As the text in the slide indicates, the *pros* of gaming in L2 education include interaction, engagement, motivation, and enhanced contact with people and culture. In another digital story, Group 1’s, the participants countered the notion that gaming may not have educational value. To the contrary, they argued, games are the traditional way for humans to learn, and schools are, according to a quote they borrowed from Chris Crawford (2011), “the violator of tradition” (Chapter 2, para. 5). Comments such as these, about the *pros* of educational games, appear in all four of the primary data sets. In the following paragraphs, I delineate the types of *pros* the participants identified and discussed.

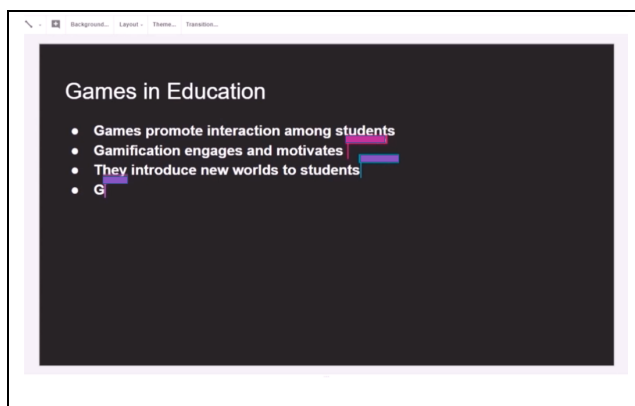


Figure 17. Beliefs about games in education. Group 3 participants expressed their beliefs in a collaborative Google Slides document, which they embedded in their digital story.

Among the most commonly cited *pros* of gaming was its positive impact on learner affect. Multiple participants expressed views similar to those of Participant 2:

The most intriguing part in educational games is enjoyment. Games are attractive because they are fun, and thus people get motivated to play. It is the magic of intrinsic motivation that makes games appealing for all ages and groups of people.

The types of descriptive vocabulary Participant 2 employed (e.g., *enjoyment*, *fun*, *intrinsic motivation*) appeared frequently in the many other participants' (e.g., Participants 3, 7, 12 13) posts about gaming. In addition to the discussion threads, these types of beliefs appeared in the other primary data sets. For example, Group 1 stated in their digital story that employing games would be a “fun way” to engage learners in purposeful and authentic communication within realistic contexts.

The ability of games to “enhance students’ motivation,” as Participant 14 put it, was a belief the majority of the participants (e.g., Participants 2, 3, 4, 7, 8, 10, 12, 13, 14, 15, 16) held. In addition to motivation, engagement in learning was another positive outcome of game use in L2 education the participants frequently cited. In fact, the two lexemes, *motivation* and *engagement* appeared frequently in the same comments or even the same sentence. For example, Participant 4 stated that “[s]tudents will *engage* and *motivate* a lot easier if the usage of

technology and games are part of the tools used in class” (emphasis added). Other lexemes related to *engagement* that some participants employed were *immersion* (e.g., Participants 2, 9) and *captivation* (Participant 10). As these examples suggest, many of the participants believed that gaming in L2 education served to motivate and engage students in learning.

The participants also noted that they believed educational games could have a positive impact on other aspects of learner affect, such as learner anxiety. Participant 15, for example, stated that educational games “will immediately lower students’ affective filter and enhance their participation in class.” Participant 12 pointed out how “[s]hy or introvert students who love gaming will find it easier to talk and discuss their ideas when learning in ‘safe and familiar’ environment.” The positive impact on learner affect was one of the most frequently cited reasons supporting the use of games in L2 education.

Other gaming *pros* the participants identified include the ability of games to respond to students’ learning expectations and/or match individual learner characteristics (e.g., ability, age levels, learning styles or preferences). Participant 5 noted that educational gaming has the ability to respond to individual learner interests or needs: “By utilizing digital gaming, we can meet learners’ different learning styles and multiple intelligences’ need concurrently.” Participant 2 pointed out that the responsiveness of games to learners with “different learning styles and needs” is the source of their ability to motivate. Participant 16 expressed a belief that since many students play video games at home, they may enjoy or prefer using them to learn at school.

The majority of the participants indicated they believed games can be effective in L2 education and suggested multiple reasons why. Among the reasons are the impact educational games may have on learner affect, such as enjoyment, reduction of anxiety, and motivation. They also perceived games to engage students in learning and be responsive to their individual

learning needs or desires. Expressions of beliefs such as these occurred frequently in all four of the primary data sets.

Cons of educational games. While most or all of the participants expressed positive perceptions of educational games, some of them cited potential drawbacks or aspects of gaming that merit caution. One potential *con*, according to Participant 16, was that the cost of hardware or subscriptions to websites could make the use of educational games prohibitive in schools. Participant 14 indicated she had doubts about whether games were suitable for students of every age level:

it is more beneficial for younger students than adults. We always link ‘games’ with kids, maybe this connection occurs more in the Saudi society more than American society. But if we look at the educational games out there, most of them are for kids. I wonder!

Participant 14 also cautioned that the effectiveness of gaming could depend, in part, on the course subject matter. Another concern, according to Participant 12, is that the failure to prepare students to play games could “be a cause of anxiety instead of an anxiety relief!” Yet another issue, which Participant 3 raised, was the potential to sacrifice class time when having students log in and out of games.

While most of the participants focused primarily on the *pros* of educational games, Participant 5 wrote a relatively lengthy discussion thread post cautioning against the use of games in L2 education in the discussion threads. He began by citing a quote from an article by the course instructor, “not all games are equally suited for language purposes” (Liontas, 2016, p. 2), and then went on to distinguish between games produced for commercial and educational purposes. The former, he argued, may contain inappropriate content, not promote learning, and/or incur excessive costs. Participant 4 agreed with him about commercial games containing

inappropriate content and added that learners may not become as interested in educational games as commercial games.

Participants' personal interests in and experiences with games. In this section, I discuss discoveries related to participants' perceptions of educational games based on their interests, experiences, or plans to employ educational games in the future. Most of their perceptions and experiences were positive in nature. I discuss these discoveries in the following paragraphs.

Some of the participants discussed their perceptions of gaming based on their own experiences of learning an L2 with educational games. For example, Participant 11 posted, “[a]s a person who has achieved great success in understanding my second language, English, I believe that gaming has had a great impact on my edification.” Participant 12 shared similar positive experiences, but also added that another reason she had enjoyed learning with games was that they had provided her with the satisfaction of sharing her learning with other people. In a response to Participant 11’s discussion thread post (above), Participant 10 stated she wished she had also had such positive learning opportunities with games when she was a student.

Gaming experiences involving family or students were also topics of dialogue in the discussion threads. For example, two participants (Participants 7, 13) witnessed how educational games had benefitted family members by promoting motivation. Participant 7 described how she integrated games into parts of her lessons on a daily basis to “review or introduce an L2 concept and skill or vocabulary words.” The result was that her students became motivated and engaged in her lessons. Participant 7 also pointed out the versatility of educational games, noting that she liked having the option to use either digital or paper-based versions of some games.

The participants also discussed their plans to employ gaming in the future. Participant 5, for example, stated, “As an ex-gamer, I am intrigued by the prospect of utilizing digital gaming

in language learning.” However, while some of the other participants also shared their plans to employ games in future work, they indicated they did not have much experience or personal interest in playing games themselves (e.g., Participants 4, 12, 10, 12, 13). For example, Participant 12, who stated “I am not a gamer myself,” indicated she plans to use games in her “future classrooms for the sake of the students to feel interested and motivated.” The views of Participant 13 were similar in that while she recognized the potential of gaming in L2 education, she indicated she had no personal interest in playing them herself.

Beliefs regarding gaming focused on three different topics. First, citing the course instructor and course readings (e.g., Lontas, 2016), the majority of the participants stressed that game use must be purposeful in order to have value in L2 education. Second, the majority of the participants perceived value in game use and identified potential *pros*, such as enjoyment, motivation, and engagement. However, some participants also pointed to potential *cons*, including prohibitive costs, unsuitability for some age groups, commercial game unsuitability, and lack of quality with education-focused games. Third, the participants also discussed their prior personal experiences with educational games, personal interest or disinterest in (educational) games, and plans to employ them, or not employ them, in the future.

Google Apps. While some expressions of beliefs regarding Google Apps (e.g., Docs, Slides, Forms) appeared in the digital survey and semi-structured interviews, the vast majority of them were in Group 3’s digital story, which focused primarily on this (tele)collaborative learning platform. The Google Apps Group 3’s digital story focused on were Docs, Slides, and Forms. Group 3’s digital story included both commentary by a narrator (Participant 8) and dramatizations of an instructor (also Participant 8) using Google Apps with Participants 7, 15,

and 17, who played the roles of students. Another member of the Group 3, Participant 5, served as the editor of their digital story and did not perform in the dramatizations.

Group 3's digital story explicitly and implicitly expressed beliefs regarding Google Apps, which primarily focused on why it can be a valuable tool in L2 education. The participants expressed these beliefs explicitly through narration and implicitly through dramatizations of themselves employing Google Apps in L2 learning contexts. The main themes of their beliefs related to the following capabilities of Google Apps: automatic data saving, (tele)collaboration, and assessment functions. I discuss each of these in the paragraphs below.

Automatically saving data. Focusing on the theme of data storage and loss, the opening scene in Group 3's video is a dramatization of what appears to be a student whose document or file disappeared as he used a laptop computer. The images, sound effects, sad background music, and the student's actions combined to express the shock and frustration students may feel when technical difficulties cause the loss of a file upon which they have worked. In multiple locations in their digital story, Group 3 suggested that a solution to data loss problems is to employ Google Apps, with which, as the narrator (Participant 8) put it, "everything will be saved automatically."

While the participants of Group 3 employed various modalities (e.g., written language, spoken language, body language), to promote Google Apps' ability to automatically save data, they also employed combinations of modalities in *concurrency* (Unsworth, 2006) to express their point in a more salient manner. *Concurrency* refers to the use of more than one modality to express meanings about a particular topic (Unsworth, 2016). Figure 18 is an example of *concurrency* called *exemplification*, in which one modality represents a relatively more specific example than another (Martinec & Salway, 2005; Unsworth, 2006). The text in a red box at the top of the image, which reads "All changes saved in Drive," conveys information of a relatively

more general nature. Also note how Group 3 made the text *salient* (Kress & van Leeuwen, 2006; Serafini, 2014, 2015), thus stressing its importance, by employing red-colored framing (Unsworth, 2006) and a red arrow. Part of the narration during this scene, which includes the phrase “your entry will be automatically saved,” is the relatively more specific aspect of *exemplification* (Martinec & Salway, 2005; Unsworth, 2006). Through the use of *concurrency*, *salience*, and *framing* (Kress & van Leeuwen, 2006; Macken-Horarik, 2003; Serafini, 2014, 2015; Unsworth, 2006), Group 3 participants strongly expressed their belief that a *pro* of Google Apps is their ability to save data automatically. The opening scene of Group 3’s digital story, which I discussed above, is another example of how Group 3 employed multiple modalities (body language, music, written language, images) in *concurrency* (Unsworth, 2006) to express meanings related to the importance of saving or losing work files. In this scene, an actor acted shocked as he realized he had lost his data or document on his laptop computer. Dramatic background music also contributed to the meaning that Group 3 seemed to want to express in this scene, which was that the actor had experienced some type of negative affect due to a data storage malfunction.

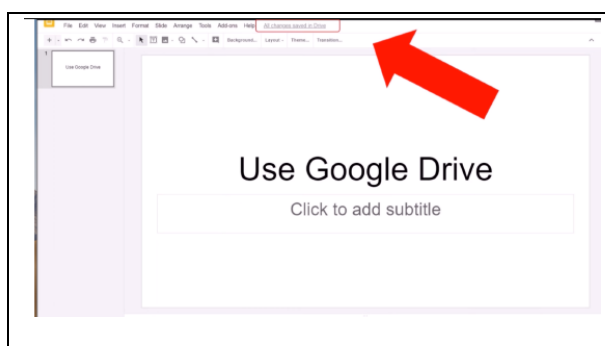


Figure 18. Use of *salience* and *exemplification* in digital storytelling. Group 3 participants employed *salience* (Kress & van Leeuwen, 2006; Serafini, 2014, 2015) and *exemplification* (Martinec & Salway, 2005), a type of *concurrency* in which one modality conveys specific information and another conveys more general information (Unsworth, 2006).

Enabling (tele)collaboration. Another major reason Group 3 promoted Google Apps was the ability of these online tools to enable (tele)collaboration. Group 3 summed up their beliefs about this topic by answering, and providing rationales for, a question they posed: “So, the question is should language educators use Google Apps in class? Yes! Because Google Apps make collaboration easier. Students can create a common product by interacting with each other and accomplish the given task together.” Much of Group 3’s digital story, including its commentary, dramatizations, and multimodal content, served to implicitly express Group 3’s belief that Google Apps facilitate collaboration and telecollaboration. In their digital story, they showed multiple examples of groups of students working on the same Google App concurrently.

In their discussions of (tele)collaboration, Group 3 employed another type of *concurrency* called *ideational instantiation* (Unsworth, 2006). *Ideational instantiation* is a form of concurrency in which one of the modalities represents one *instance* of the recurring activities the other modality expresses (Unsworth, 2006). As I described the following example of *ideational instantiation* in the discoveries for Research Question 2, I will only briefly describe it here. In this example from Group 3’s digital story, as the narrator (Participant 8) stated, “Google Slides is similar to the PowerPoint, but it’s built for online collaboration, which means you can simultaneously edit your slides,” three participants simultaneously worked on the slides (see Figure 5). The participants’ action in the skit (i.e., working on one Google Slide document together) were an *instance* (Unsworth, 2006), or example, of what the narrator had stated about Google Slides enabling collaborative work. This example of *ideational instantiation* was one of multiple ways in which Group 3 expressed their belief that Google Apps were an effective tool for the promotion of collaborative learning.

Usefulness for assessment. Multiple participants indicated they believed Google Apps were useful tools for assessment of learners' abilities. In her semi-structured interview, Participant 8, who was also a member of Group 3, pointed to the potential value of Google Forms in formative assessments: "you can use it for mini-assessments ... at the end of your class." In Group 3's digital story, they demonstrated the usefulness of Google Forms in assessing vocabulary acquisition. The narrator, Participant 8, explained to the students the purpose of the formative assessment (quiz): "I will use your answers to decide if I can give you a quiz on Monday or I should have more activities to help you understand the new vocabulary we have learned today." By demonstrating (i.e., dramatizing) its potential uses in assessment, Group 3 implied that Google Forms are an effective means for teachers to assess their students' abilities. This scene is also another example of how Group 3 employed *ideational instantiation*, or using one modality to portray an instance of a recurring activity portrayed with another modality (Unsworth, 2006). In this case, the narration and example of a "Vocabulary Building Assessment" (see Figure 19) were *instances* of the recurring activity stated in white print on a screen with a black background: "Using Google Forms as an English Language Evaluation Tool" (see Figure 19).

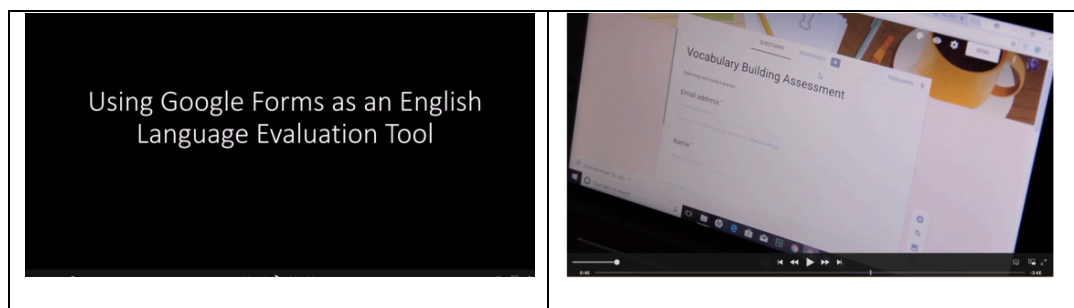


Figure 19. Vocabulary assessment with Google Forms.

The majority of the participants' perceptions about Google Apps appeared in Group 3's digital story. In their video, they promoted the use of Google Apps (Docs, Slides, Forms) in L2

education as a means to facilitate L2 learning. Their rationales were that Google Apps automatically save data, enable collaborative learning, and provide assessment tools. Group 3 employed ideational *concurrency*, or the concurrent use of multiple modalities (Unsworth, 2006) to express their beliefs about the potential value of Google Apps in L2 education. The types of *concurrency* they employed included *exemplification* (Martinec & Salway, 2005; Unsworth, 2006) and *instantiation* (Unsworth, 2006).

Learning management systems. While expressions of the participants' beliefs regarding learning management systems (LMS) appeared in all four primary data sets, the majority of them were in Group 2's digital story, which focused on LMS in general and Canvas (an LMS platform) in particular. The first part of Group 2's video explicitly expressed beliefs regarding LMS, but the beliefs in the second part were more implicit in nature as the narrator (Participant 17) introduced Canvas and demonstrated how to employ its functions as he discussed and designed the contents of a Spanish-as-a-foreign-language education course. By discussing and modeling their capabilities, Group 2 sought to promote the use of Canvas and LMS in general. However, Group 2 also recognized that there may be resistance to the use of LMS among stakeholders.

The majority of the participants' beliefs regarding LMS focused on their *pros*, or positive reasons to use them in L2 education. They were primarily beliefs that LMS (e.g., Canvas) offer an array of functions for teaching and learning, and that they make teaching and learning easier and more efficient. These sets of beliefs are closely linked in that the functions LMS offer represent the reasons the participants believed these platforms improve the ease and efficiency of L2 education. However, the participants also discussed other LMS-related topics, such as issues

to consider before employing LMS and stakeholders' resistance to their use. In the following paragraphs I address each of these beliefs and illustrate them with examples from the data.

An array of functions for teaching and learning. While individual participants expressed beliefs regarding LMS, the majority of the relevant data appeared in Group 2's digital story, which focused on this educational technology. Group 2, by describing and modeling the capabilities of LMS, sought to promote their use in L2 education. The LMS function-related topics included viewing multimodal presentations, formative assessments, discussion threads, and links to resources for learning about course material.

One of the ways Group 2's digital story promoted Canvas was by describing its ability to allow students to see multimodal presentations within or outside the LMS. Regarding these functions, the second narrator (Participant 17) of Group 2's digital story stated,

you can incorporate the prepared presentation into Canvas and then ask students to view the presentation before or during the class. Students can either see the presentation on Canvas, the main interface, or they can download the presentation and then watch it via their Microsoft presentation PowerPoints.

Group 2 also described Canvas's ability to assess students' acquisition or understanding of the target language. The example they provided was its ability to assess knowledge of Spanish language vocabulary and articles (see Figure 20). The narrator described creating quizzes as easy while showing an example of the a in a Canvas page. This is yet another example of how Group 2 employed *ideational instantiation*, a type of *ideational concurrence* in which one modality (e.g., the image in Figure 20) represents an *instance* of recurring activities expressed by another modality (the description of Canvas's quiz functions) (Unsworth, 2006). Other functions of Canvas that Group 2's narrator described were discussion threads and the ability to offer

resources, or links to resources, that students may employ to deepen their understanding of course materials.

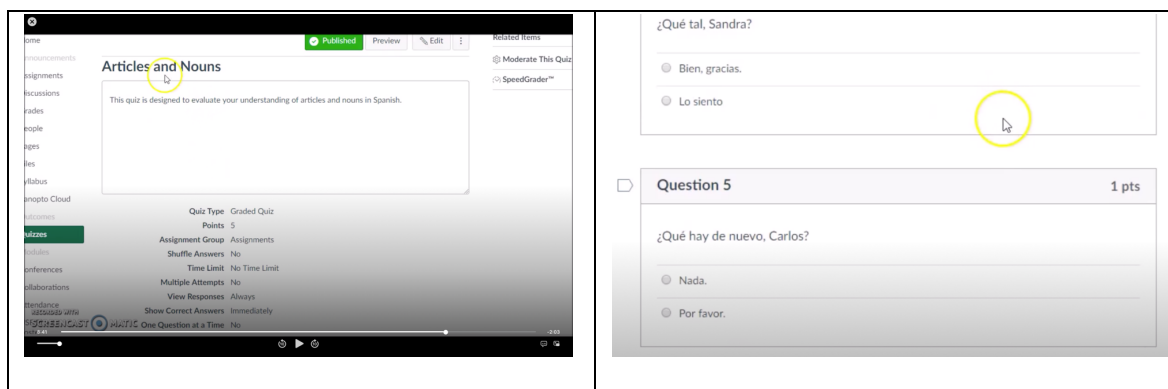


Figure 20. Example of Spanish language quiz in Canvas. The narrator of Group 2 described quizzes course instructors can create in Canvas, a type of LMS.

In the online asynchronous discussion threads of this dissertation, Participant 13, who was also the first narrator in Group 2's digital story, expressed how the use of LMS can positively impact the processes of teaching and learning, and the roles of teachers and students:

The idea of teachers as "facilitators" becomes more possible through the utilization of an LMS, as our Canvas LMS team presented with our Digital Storytelling Group Project. Students become more active learners, while teachers evolve into facilitators in the teaching and learning 21st-century classroom.

On a similar topic, in her semi-structured interview, Participant 13 indicated that she liked how LMS could help learners achieve ownership of their learning. In particular, she liked that with LMS students can access their assignments from home, libraries, or other places beside school that offer internet access. These types of capabilities, she believed, can help learners take responsibility for completing their coursework. Other perceptions of the *pros* of LMS appeared in Participant 17's survey responses, where he noted the following about both Google Apps and Canvas: "1. Helpful to create a structured learning environment. 2. Allowing students and teacher(s) to exchange feedback and share information." These various examples illustrate that

multiple participants believed that LMS offer different capabilities that can improve teaching/learning processes and positively influence the roles of students and teachers.

Making teaching easier and more efficient with LMS (or Canvas). The participants, Group 2 in particular, expressed beliefs that some of the ways in which LMS can improve teaching and learning include making it easier and more efficient. For example, the first narrator in Group 2's digital story (Participant 13) succinctly stated that LMS can "simplify teaching and learning by connecting all the digital tools teachers use in one easy place." The second narrator (Participant 17) of Group 2's digital story, illustrating the ability of Canvas to perform formative assessment, offered a specific example: "[e]asily, you can create an [*sic*] quiz in each module." In addition, throughout his section of Group 2's digital story, he implicitly expressed similar beliefs regarding Canvas by demonstrating the ease with which instructors can employ its functionality. This section of Group 2's digital story consisted primarily of video screen captures in which he modeled how to employ Canvas to create the contents of a Spanish-as-a-foreign-language course. This served as a promotion of LMS by demonstrating how easily teachers can create course contents. Throughout the second half of Group 2's digital story, Participant 17 also employed *instantiation*, a type of ideational *concurrency* (Unsworth, 2006). As he explained the various features Canvas offers in general terms, he demonstrated specific *instances* of employing them by creating course contents in real time. He recorded this process with screen capture videos, which make up a large proportion of the section of the digital story he narrated.

While the beliefs of Group 2, Participants 13, and Participant 17 regarding LMS were mostly positive, Participant 13 discussed obstacles to their use. She perceived some opposition to LMS use among some high school teachers she knew. Additionally, to her knowledge, only some of the high schools in the area employed an LMS, and at those high schools only some of

the teachers chose to use it. She believed that teachers' unfamiliarity with LMS may have been a cause of their reluctance. Participant 13 additionally addressed issues related to LMS implementation in the section of Group 2's digital story that she narrated.

LMS, in general, and Canvas, in particular, were among the types of educational technology the participants promoted. However, most of the participants' beliefs about these types of educational technology appeared in Group 2's digital story, which focused on LMS and a type of LMS called Canvas. The reasons Group 2 put forth for employing LMS included its abilities to make teaching/learning easier and more efficient, and its potential to enable students to take ownership of their learning. According to the participants, with LMS, students can view multimodal presentations, engage in discussion threads, and have formative assessments of their L2 abilities. According to Group 2, these capabilities represent reasons that teachers should employ LMS.

Annotations and glosses. The participants also turned their attention to text annotations and glosses, particularly digital ones, which can serve as mediation for reading comprehension. However, while the participants discussed annotations and glosses with enough frequency to merit their inclusion in the discoveries for Research Question 4, they did appear relatively less frequently than the other technologies whose discoveries I have described above. Annotations and glosses were not the subject of any of the groups' digital stories, but the participants discussed them in the discussion threads.

Overall, the participants expressed positive perceptions of annotations and glosses. For example, Participant 2, who cited a course reading on text annotations (Liontas, 2001b), posted in the discussion threads her perception of the impact multimedia or multimodal annotations may have on reading comprehension: "learners are offered global opportunities to deal with the text."

Agreeing with Participant 2's post, Participant 1 stated that multimedia or multimodal annotations also "build on student's previous knowledge in their L1" while being responsive to their "different learning styles." Participant 9 expressed a belief that multimodal annotations can provide deeper and more understandable explanations of culture that written ones could not. Participant 8 pointed out that the course instructor, who was the author of a course reading (Liontas, 2001b), indicated that allowing learners to choose among a variety of types of annotations would enhance L2 learning. As these examples illustrate, the participants expressed positive perceptions of the use of annotations and glosses in for L2 reading.

In this second section of Research Question 4, I described the discoveries about the participants' beliefs and perceptions of different types of educational technology, particularly AI, immersive technologies (AR and VR), CAT, educational games, Google Apps, LMS, and annotations and glosses. While the participants expressed different beliefs about each of these types of technology, they primarily focused on how their use could help L2 students learn target languages and cultures. The participants also frequently discussed their own personal interests or experiences with these technologies. In general, the participants had mostly positive perceptions of the educational technologies they discussed.

The ET-related knowledge of the participants and other educators. The third of the three major groupings of ET-related perceptions in the data includes the various beliefs the participants expressed about topics related to knowledge of educational technology. The participants frequently mentioned the ET knowledge or skills they possessed, lacked, and/or wanted. They also discussed the types of ET-related knowledge they believed other educators have or should have, and how they may acquire that knowledge. In this section of Research Question 4, I discuss discoveries related to these topics.

Participants' ET knowledge. Throughout the primary data sets many of the participants discussed the educational technology knowledge they possessed, lacked, and/or desired. I organized these discussions into the following two groupings: possessed and desired ET knowledge before or at the outset of the course; and knowledge acquisition and belief changes during or after the course. I discuss each of these ET knowledge-related perceptions in the following paragraphs.

Possessed and desired knowledge. Some participants indicated they believed they had generally possessed, at least in some respects, adequate ET-related knowledge or skills before enrolling in the course. Participant 14, for example, indicated she believed she was generally confident with her IT abilities. Another participant, Participant 11, stated she had “good skills in Programing and Web designing.” However, other participants indicated they lacked or desired ET knowledge or capabilities. Participant 8, for example, stated

I want to become familiar with the research on the CALL tools that I used in the past and I want to learn about new tools that I have not used before. I am hoping to discover new and better ways of practicing widespread tools.

Participant 15 wrote in a discussion thread post, “I want to develop my skills using technology to teach a second language motivating my students to learn and to make language and culture accessible for them.” In a discussion of professional standards and a desire to employ CALL effectively, Participant 7 indicated “I should know what and where my resources are, weed the resources, have proper training for myself and students on how to use the resources, and implement the resources effectively to promote student engagement and language and cultural proficiency.” At the outset of the course, Participant 16 posted she anticipated she and her classmates would benefit from learning how to teach with technology, which she believed was

indispensable in this era. VR and AI were technologies whose future impact interested Participant 12, who believed they would reduce the cost of learning.

In addition to the online asynchronous discussion threads, which were the main data source for this part of the discoveries for Research Question 4, the digital survey also provided data on this theme. In particular, Item 15 asked, “What new types of technology would you like to learn more about or employ in your future teaching?” Eight of the fourteen survey respondents (Participants 1, 2, 6, 7, 8, 9, 10, 15) indicated they were interested in learning about or employing AR and/or VR in the future. Addressing the rationale for his answer, Participant 6 explained

To put the learner in the environment and immerse them in that culture while they are interacting with the language. I believe in the future these technologies will be more feasible to obtain and implement in classroom with less cost.

In addition to AR and VR, two of the survey respondents participants, Participants 2 and 15, stated they were also interested in AI.

ET knowledge acquisition and changes in beliefs. The participants frequently discussed ET knowledge they had acquired in the course or changes in their beliefs regarding educational technology. Participant 10, for example, shared that although she had previously been unconcerned with educational technology, through participation in the course she had developed an understanding of the importance of educational technology for effective education. Participant 6 indicated he came to understand that teachers who want to employ educational technology effectively should understand their students in order to be able to adapt its use to individual learners’ characteristics, needs, and preferences.

References to specific types of ET knowledge acquisition also appeared in the data. CALL and MALL were technologies Participants 12 and 16 cited, with the former stating she

had learned “which CALL/MALL technologies are currently in market and which ones are proven to be more effective than others.” “AR/VR and gamification” were topics about which Participant 2 enjoyed learning because she had an interest in implementing those types of technologies in L2 education. Participant 11 shared that she had also learned about these technologies. PowToon was a technology with which Participant 14 had become familiar. As these examples and illustrations indicate, the participants believed they had acquired a variety of knowledge about educational technology through participation in their course.

Other educators’ ET knowledge. In addition to discussing topics related to their own ET knowledge, the participants frequently stressed that educators in general need to possess ET knowledge and offered suggestions regarding how they should acquire it. A common belief expressed in the data was the need for educators, including the participants themselves, to engage in professional development to improve their ET knowledge or skills. Support for professional development and support for the implementation and employment of educational technology were responsibilities of teachers’ schools, the participants believed.

Multiple participants (e.g., Participants 10, 16) also noted they believed they and other educators had an obligation to learn about or understand educational technology. While references to L2 teachers were often in the third-person plural (e.g., *they*), they also appeared in the first-person plural (e.g., *we*), which indicated the participants’ statements regarding teachers’ duties to learn about educational technology also applied to themselves. Discussing these topics, the participants employed vocabulary relatively to the strong side of the Modal obligation cline (Eggins, 2004; Halliday & Matthiessen, 2014), such as *need* (Participants 2, 9, 10, 13, 16), *necessary* (e.g., Participant 4), *should* (e.g., Participants 1, 5, 13), and *must* (e.g., Participants 13, 16). Participant 16, for example, stated “before *we*, as teachers can imagine tomorrow’s

classrooms, *we need* to find ways to keep up with the latest technologies available to utilize in our classrooms today” (emphasis added). Participant 10 expressed similar beliefs in similarly strong terms: “If *we* do not stay up-to-date and offer our students a foundation in tech-based learning and literacy, they will be greatly disadvantaged when they leave our classrooms for their next step” (emphasis added). Participant 5 shared similar views that “*we should* be aware of the opportunities that digital multimedia technology can bring as well as the limitations that come with it instead of just chasing down the latest and greatest” (emphasis added). As these examples illustrate, the participants expressed relatively strong views that teachers, including themselves, need to acquire and keep up with knowledge about educational technology.

Multiple participants also stressed the reasons for educators to possess ET knowledge. Participant 13, for example, stated,

In the USA, there is not so much a ‘digital divide’ with students (technology exists in schools now pretty much everywhere), however, there is presently a "digital divide" between educators (administration & teachers) and students in their skills and how to use technology effectively in the classroom.

Participant 13 further stressed that teachers need to overcome the “digital divide,” or gap in ET-related knowledge that exists between young students and teachers. Participant 4 also offered a rationale for teachers’ ET-related professional development: “The technology is advancing by leaps and bounds and teachers and learners cannot be left behind.” Agreeing with a discussion thread post by Participant 7, Participant 5 stated “I like the idea that proper training needs to be given to both the educators and students on using the technology as we should not assume that everyone can utilize the technology automatically.” As these examples demonstrate, a reason that

participants believed teachers need to acquire and keep up with ET knowledge is that they think students often know more about educational technology than teachers do.

In a scene in Group 2's digital story, which I discussed in the discoveries for Research Question 2, the participants stressed the need for teachers to use educational technology (see Figure 12). In this scene, which involved ideational *concurrency*, or the expression of the same or similar ideas with different modalities (Unsworth, 2006), both the narration and on-screen text stated "technology won't replace teachers, but teachers who use technology will probably replace teachers who do not." Group 2's multimodal message, then, could imply that a lack of ability or desire to employ educational technology could result in teachers losing their positions.

Participants also suggested that schools should provide teachers with ET-related support and/or professional development. A primary rationale for this, according to some participants (e.g., Participants 4, 9, 14, 16), was that effective employment of educational technology depended on support from schools or school administrators. Participant 16, for example, stressed in a discussion thread post that "support from district and school administration" was important because of the major impact educational technology can have on learning. Other participants (e.g., Participants 1, 7, 15) agreed with Participant 16 and expressed beliefs that administrators should provide teachers with support and/or training because of the importance, or perceived importance, of educational technology in L2 education. Expressing similar views, Participant 9, stated "[s]chools need to support educators in their technology training, it would be impossible to pass that knowledge onto students without a foundation." Other rationales for school support for ET training included improvement of teacher confidence with educational technology (Participant 16) and learning how to employ technology that targets specific teaching objectives (Participant 4). However, in addition to posts about rationales for ET training and support,

Participants 7 and 14 also suggested a method, which was having teachers attend conferences to learn about educational technology.

As the above examples illustrate, throughout the data the participants frequently discussed the ET-related knowledge they possessed before the start of the course, the ET knowledge they acquired in the course, and the ET knowledge they wished to acquire. They also expressed beliefs about what types of educational technology teachers, including themselves, should possess, and *how* and *why* they might go about acquiring it. Participants' perceptions and beliefs related to ET knowledge or skills were prominent throughout the data.

Summary of Research Question 4 discoveries. In my description of the findings for Research Question 4, I discussed three categories of ET-related perceptions I identified in the data: beliefs about rationales for the implementation and employment of educational technology; perceptions of different types of educational technology; and knowledge of educational technology. The first group of perceptions included strongly-worded expressions of beliefs that effective use of educational technology requires purposeful implementation with learning objectives in mind. This category of perceptions also included the participants' beliefs about the ways in which educational technology could positively impact learning processes and outcomes, which were, in turn, rationales for employing educational technology. The second group of perceptions included plentiful and various beliefs the participants expressed about a number of different kinds of educational technology, which were mostly positive but also negative. The participants' perceived *pros* of these technologies also served as rationales for their use in L2 education. The third major category of perceptions were those about educational technology knowledge and skills. The participants indicated what type of ET knowledge they desired, ET knowledge they had possessed prior to the course, and ET knowledge they acquired in the

course. They also discussed the types of ET knowledge they believed educators, including themselves, should acquire and how and why they should acquire it. A common thread throughout the participants' various perceptions and beliefs was that educational technology implementation should be effective, efficient, and purposeful so that it promotes learning for L2 students.

Likert-Scale Items in Survey

In this section of Chapter 4, I report the findings of the Likert-scale items from the digital survey. While I consider this dissertation primarily a qualitative research study, the results of the Likert-scale items are quantitative. I report the findings for each Likert-scale item, including its mean. Table 16 lists the nine Likert-Scale items in the digital survey (survey items #25–#33) and their means. The answer choices on the Likert-scale items ranged from *strongly disagree* (1) to *strongly agree* (5). In their responses, the majority of the participants indicated they enjoy learning about new types of educational technology (Mean 4.93), and that teachers and teacher educators have a duty to continue learning about educational technology over the course of their careers (Mean 4.79). They also generally believed educational technology can play a valuable role in both teaching (Mean 4.79) and learning (Mean 4.79) a second or foreign language. The participants generally indicated they believed they had learned a lot about educational technology from their course (Mean 4.29) and from their classmates (Mean 4.07). However, the participants did not appear to believe their course was overly challenging (Mean 3.64). Regarding the collaborative digital storytelling project in their course, the participants indicated the experience was enjoyable (Mean 4.79) but not particularly difficult (Mean 2.71).

Table 16

Likert-Scale Items in Digital Survey

25. I learned a lot about educational technology in the course FLE 7700 Applications of Technology to SLA and FL Education. (Mean 4.29)
26. The course Applications of Technology to SLA and FL Education (FLE 7700) was challenging. (Mean 3.64)
27. I learned a lot from my classmates in the course FLE 7700 Applications of Technology to SLA and FL Education. (Mean 4.07)
28. The digital storytelling project in FLE 7700 was enjoyable. (Mean 4.79)
29. The digital storytelling project was difficult. (Mean 2.71)
30. Educational technology can play a valuable role in learning a second or foreign language. (Mean 4.79)
31. Educational technology can play a valuable role in teaching a second or foreign language. (Mean 4.79)
32. I enjoy learning about new types of educational technology. (Mean 4.93)
33. I think it is the duty of teachers and teacher educators to continue learning about educational technology over the course of their careers. (Mean 4.79)

Summary of Dissertation Discoveries

This dissertation took place in the college of education at a large research university located in the Southeast of the United States. The participants were 16 doctoral students enrolled in a doctoral-level course on the use of educational technology in L2 education, along with one doctoral candidate who observed the course. All seventeen participants were members of a doctoral program focusing on second language acquisition and educational technology. The research questions I sought to answer in this dissertation regarded the ET-related themes in online asynchronous discussion threads, ET-related themes in digital stories the participants collaboratively created, the participants' experiences in their collaborative digital storytelling projects, and the participants' perceptions of educational technology. Two of the dissertation's primary data sets consisted of copies of the participants' collaboratively created digital stories and their posts in six weekly online asynchronous discussion threads. Both of these activities were graded assignments in their doctoral course. The other two primary data sets were a digital

survey and semi-structured interviews, both of which I conducted after the completion of the course. Fourteen of the 17 participants responded to the digital survey and seven randomly chosen participants took part in the semi-structured interviews.

The findings for the first research question, on the ET-related themes in the online asynchronous discussion threads, indicated the participants expressed beliefs regarding various topics. One theme involved their beliefs about both educational technology in general and multiple specific types of educational technology. They expressed their beliefs about these technologies' *pros* and *cons*. A second theme focused on ET-related knowledge and skills. A third theme involved their beliefs regarding L2 learners and how educational technology implementation and employment should focus on learners. A fourth theme included the participants' perceptions of the ways in which educational technology may impact the teaching and learning of languages and culture. In the fifth and final theme, the participants turned the focus to themselves in discussions related to their doctoral-level course. They discussed their perceptions of their course activities, classmates, and what they learned in the course.

The second research question focused on the ET-related themes embedded in the digital stories the participants collaboratively created. One of the themes involved the ways in which educational technology impacted the processes, products, and learners in L2 education. In particular, they stressed how educational technology could positively influence collaborative learning, learner affect (e.g., motivation, emotions), and motivation. They also discussed the *pros* of the specific types of educational technology they promoted, which were LMS, AR, VR, and Google Apps. Another theme in the digital stories was that of the identities and roles of teachers and students. The participants expressed beliefs that technology made it more possible for students to become more responsible for their education and to take the lead in their learning.

The participants also supported student-centered education in which teachers take supportive roles that aid students in constructing their own knowledge. A third theme in the digital stories were the notions of *change* and *adaptation*. The digital stories frequently referred to how changings societies and rapid developments in educational technology required changes in teaching approaches to meet the needs and wants of *digital natives* (Prensky, 2001). They stressed that teachers who did not keep up with knowledge of new technology would be doing their students a disservice and would be left behind by the field of education. Discussions of change and adapting to it appeared frequently in the digital stories.

The third research question focused on the experiences of the participants in their digital storytelling project, which was an assignment that counted for 40% of the final course grade. The four themes I identified in the data sets were positive project experiences; evaluations of collaboration; outcomes and benefits from participating in the digital storytelling project; and challenges faced. The first theme involved the participants expressing their perceptions of positive experiences during their collaborative digital storytelling work. Most or all of the participants believed their experiences were overall positive. The second theme involved the participants indicating how they had benefitted from the project. This included statements regarding how they had learned about new types of video editing technology to create their digital stories. The third theme consisted of the participants expressing their satisfaction in collaborating with group mates to create their digital stories. There were few negative comments; however, the participants may have been aware that classmates would be able to see any negative comments in the online asynchronous discussion threads. The fourth theme included participants' statements about challenges they faced during the digital story creation process. While most or all of the participants indicated their experiences were generally positive, some

also pointed out challenges, such as dealing with unfamiliar video or animation editing software, time restraints, and arranging meeting times with busy group mates.

For the fourth research question, which focused on the participants' perceptions of educational technology and involved all four primary data sets (online asynchronous discussion threads, digital stories, survey, semi-structured interviews), I identified three themes: rationales for ET implementation and use; specific types of educational technology and their characteristics; and the ET-related knowledge of the participants and other educators. The first theme involved the participants' statements about the *pros* and *cons* of educational technology, and how understandings of these, along with knowledge of context and student characteristics, should inform critical decisions about ET implementation and use. The participants frequently discussed what educational technology has to offer to L2 education, and used these arguments as rationales for suggestions that teachers and other stakeholders should support the use of educational technology. The second theme encompassed the participants' discussions of different types of educational technology and identifying how their use may improve L2 acquisition. These arguments also served as rationales for educational technology use. The third theme that appeared throughout the data sets were perceptions of the ET knowledge that educators and students possess or should possess. The participants frequently noted the urgent need for L2 teachers to learn about educational technology to keep up with students, and suggested that schools and school leaders support them in acquiring this knowledge. The participants also frequently discussed ET knowledge they had acquired in the course or wanted to acquire throughout their careers.

Discussion of Discoveries

Multiple studies have explored the educational technology-related beliefs of pre- or in-service teachers in a variety of disciplines (e.g., Joo et al., 2018; Orhan Goksun et al., 2018; Yerdelen-Damar et al., 2017), including L2 education (e.g., Alsuhaibani, 2019; Canals & Al-Rawashdeh, 2019; Liu et al., 2017). However, to my knowledge, few to none have set out to explore the focus of this dissertation: the education technology-related beliefs of doctoral students in the field of second language education. In this section of Chapter 4, I present a discussion of this dissertation's discoveries. To do so, I first provide a brief summary of the findings for each research question and discuss the findings in relation to research in relevant fields that I covered in the literature review in Chapter 2 (Lunenburg & Irby, 2007).

Discussion of Research Questions 1 and 2.

1. *What are the educational technology-related themes embedded in the doctoral students' online asynchronous discussion threads?*
2. *What are the educational technology-related themes embedded in the doctoral students' digital stories?*

The purposes of Research Questions One and Two were to identify the educational technology-related beliefs of the participants in two different data sets, discussion threads and digital stories, which were both course assignments for the students. As the discoveries for these two questions share some similarities, although from different data sets, I present the discussion of their findings together. To explore both data sets, I employed Constant Comparative Methods (Corbin & Strauss, 2008; Fram, 2013; Strauss & Corbin, 1998); however, for Research Question 2, I also employed multimodal theoretical concepts from Unsworth's (2006) work on image-text relations.

For Research Question 1, which involved the discussion threads, I identified five themes. The first theme included the participants' beliefs about characteristics of educational technology in general and characteristics of specific types of educational technology. For the participants, these served as rationales for employing or not employing educational technology in different contexts. The second theme focused on the skills and knowledge necessary to employ educational technology effectively. The participants discussed knowledge they possessed and desired, along with the types of knowledge educators should possess and how they should acquire that knowledge. The participants believed acquiring ET-related knowledge could improve L2 education. The third theme involved discussions of the dynamics between educational technology and L2 learners. The participants frequently described students as *digital natives* (Prensky, 2001) who have more knowledge of educational technology than teachers and may want or expect to employ educational technology in their L2 education. The fourth theme focused on the impact educational technology may have on learning processes and outcomes. The participants frequently stated that educational technology could make learning more interesting and thus motivate and engage learners, who would learn the target language more effectively as a result. The fifth major theme in the discussion threads involved participants' discussions of their perceptions of the contents, activities, and classmates in their course. The participants indicated they learned much about educational technology, particularly the need to use it for a purpose, and they credited classmates, their course instructor, and his course materials for their new knowledge and understandings.

For Research Question 2, I identified three encompassing themes in the digital stories the participants had collaboratively created with the purpose of promoting different types of educational technology. The first theme involved the positive impact their chosen types of

educational technology (AR, VR, gaming, LMS, Google Apps), and education technology in general, may have on the processes (e.g., motivation, engagement), products (e.g., learning outcomes), and learners in L2 education. The *pros* of these technologies served as rationales for their employment in L2 education. The second theme in the digital stories involved discussions of the identities and roles of teachers and students. The participants believed that while traditional education has been teacher-centered, educational technology implementation and use would promote student-centered learning in which teachers serve in support roles as students engage in the construction of new knowledge (Fosnot, 2005). A third major theme throughout the digital stories were the notions of *change* and *adaptation*. The participants frequently referred to the steady pace of technological innovation, which requires teachers to continue studying to keep up, leads to changes in teaching approaches, and alters the roles and duties of teachers and students.

Having briefly summarized the discoveries for Research Questions 1 and 2, in the following sections I present discussions of them. For Research Question 1, I identified 5 themes, and for research Question 2, I identified 3 themes. To avoid redundancy, I synthesized the total of eight themes of the two research questions and organized the discussion with the following seven discussion topics: the impact of educational technology use on L2 learning; the contents, activities, and classmates in the participants' doctoral course; the participants' and other teachers' educational technology knowledge and skills; identities and roles of teachers and students; notions of *change* and *adaptation*; and multimodal expressions of meaning.

The impact of educational technology use on L2 learning. The discoveries of this dissertation were generally consistent with most of the studies I reviewed in Chapter 2 that included a focus on the perceived impact of educational technology use on L2 acquisition. The

participants in this study generally had positive views of educational technology employment, but also stressed that its use needed to be purposeful and that educators needed to have sufficient knowledge in order to be able to employ it effectively. One of the studies in the literature review with generally similar findings was Toffoli and Socket (2015), who explored university EFL instructors' beliefs about "Online Informal Learning of English (OILE)" (p. 7). Toffoli and Socket found that the participants perceived OILE to improve confidence and motivation. One of the potential *cons* of educational technology, according to Toffoli and Socket (2015), was that students might learn language inappropriate for academic contexts. In this dissertation, Participant 5 expressed similar concerns about learning language from commercial video games. In another study, Canals and Al-Rawashdeh (2019) found that EFL instructors believed the *pros* of educational technology included providing students with access to teaching materials, improving teacher-student communication, responding to the needs of struggling students, and enabling ongoing assessment and feedback. The findings of this dissertation were similar in that the participants also cited all of these as *pros* of educational technology.

Contents, activities, and classmates in the course. One of the themes present in the online asynchronous discussion threads involved the contents, activities, and classmates in the participants' doctoral-level course. The participants' discussions of course-related activities included expressions of perceptions of digital storytelling and online asynchronous discussion threads; however, as their perceptions of their digital storytelling project experiences are the focus of Research Question 3, I will discuss the digital storytelling project only briefly here. In the following paragraphs, I discuss these course activities, other contents of the course, and the participants' perceptions of their classmates.

Online asynchronous discussion threads. The online asynchronous discussion threads represented both a course activity and a rich source of this dissertation's data. In this section I discuss the participants' perceptions of the discussion thread activities, along with their value in teacher education and teacher education research. Furthermore, in these discussions, I link the discoveries to the studies on discussion thread studies I reviewed in Chapter 2

Some of the participants indicated they perceived value in participating in the online asynchronous discussion threads. Participant 15, for example, included the discussion threads among the things or people she credited for helping her “[understand] the important criteria for integrating technology into the language classroom.” Participant 11 also pointed out that she had learned “so much from the weekly discussions in which we get to read different points of views and writings we also get to either say if we agree with it or disagree.” Their knowledge gains and improved critical thinking were consistent with the findings of studies on the use of discussion threads that I reviewed in Chapter 2, such as Szabo and Schwartz (2011), who found that students who participated in discussion threads scored higher on tests of critical thinking than those who did not.

Some of this dissertation's other discoveries regarding discussion-thread use were also consistent with the findings of Hambacher et al. (2018b), whose pre-service teacher participants believed that autonomy and the presence of some structure in asynchronous online discussion threads improved their learning. In the case of Hambacher et al. (2018b), the structure took the form of assigned roles in discussions. The participants in Johnson et al. (2017) also expressed a preference for structure in their discussions. In the case of this dissertation, structure came from the prompts and course materials. Participant 15 pointed this out stating, “I think that [the course

instructor] selected crucial and unique references for us to read which helped us in having those great discussions.”

The findings of multiple studies I reviewed in Chapter 2 on the use of asynchronous discussion threads in teacher education indicated that these activities provide opportunities for pre-service teachers to engage in critical thinking (e.g., Hambacher et al., 2018b) and construct knowledge (Fosnot, 2005; Stabile & Ershler, 2015). Throughout the six weeks the participants engaged in online discussions, they frequently noted what they had learned in their doctoral-level course. Multiple participants credited their classmates for new knowledge they had acquired. And some noted that they had come to think more critically about educational technology. The findings of this dissertation add to the body of evidence that engaging pre- and in-service teachers in discussions about topics relevant to their fields may help them engage in the collaborative negotiation and construction of new knowledge. Research by Beard and Wilson (2013), whom I cited in Chapter 1’s description of the concept of *experience*, stressed that reflection is necessary for students to construct knowledge from learning experiences. The course’s discussion threads afforded opportunities for the participants to reflect on their course experiences, particularly their collaborative digital storytelling project. In these discussion threads, they also negotiated, expressed, and shared new knowledge with their classmates.

Digital storytelling. The collaborative digital storytelling project was one of the course’s main activities, and it accounted for 40% of the final grade. While the participants discussed their digital storytelling experiences in the online asynchronous discussion threads, which were the focus of Research Question 1, the contents of the digital stories, which were the focus of Research Question 2, provided insights into the participants’ beliefs about the use of educational technology in L2 education. In the discussion threads, the participants described the mostly

positive experiences they had working in groups on their digital stories, their perceptions of digital storytelling in general, and plans to employ digital storytelling in future teaching.

The discoveries of this dissertation were consistent with the findings of some of the studies on digital storytelling use in teacher education that I reviewed in Chapter 2. For example, the pre-service teacher participants in Kocaman-Karoglu (2016) had multiple positive perceptions of their digital storytelling experience, including that it was a motivational way to learn, an effective way to make course presentations, and a means for gaining technological competence. The pre-service teacher participants in Göçen Kabaran and Alkan Karademir (2017) also perceived that their digital storytelling project improved their technological competence, and believed that they had learned a new teaching method to try with their own future students. The pre-service teachers also achieved a sense of accomplishment from their experiences of creating didactic digital stories their students enjoyed. Two digital storytelling studies focusing on TPACK (Koehler & Mishra, 2009), Aşık (2016) and Kildan and Incikabi (2015), and one focusing on Digital Bildung (Krumsvik, 2014), Røkenes (2016), also found evidence that pre-service teachers had improved in their technological skills as a result of participating in digital storytelling projects.

The discoveries of this dissertation were similar to the study findings I discussed in the previous paragraphs. Multiple participants in this dissertation found their digital storytelling projects motivational and achieved a sense of satisfaction with their products (i.e., the digital stories) and what they learned from their experiences. Multiple participants credited their digital storytelling projects with helping them to learn more about educational technology, including both the technology promoted in the digital stories and the video editing software they employed to create their digital stories. Some participants also noted that, in their future teaching, they

planned to either employ digital storytelling as a didactic tool or have their students create their own digital stories. The digital storytelling studies I reviewed in Chapter 2 and the discoveries of this dissertation support the use of digital storytelling in teacher education as a motivational and satisfying means for pre- and in-service teachers to learn new activities to conduct with future students while improving their own ET knowledge. Furthermore, if the pre- or in-service teachers create didactic digital stories with contents related to their disciplines (e.g., ESL, EFL), their digital storytelling projects may also contribute to their TPACK (Aşık 2016), which is the intersection of knowledge related to *technology*, *pedagogy*, and *content* (Koehler & Mishra, 2009). Teacher educators and researchers interested in promoting different types of teacher knowledge, may wish to consider frameworks such as TPACK to help with the design of digital storytelling projects.

While this dissertation's participants' digital storytelling project experiences were mostly positive, the participants noted they faced some challenges during the process of creating their digital stories. Participants in some of the digital storytelling studies I reviewed in Chapter 2 also pointed to challenges they faced during their digital storytelling projects. Pre-service teachers in Göçen Kabaran and Alkan Karademir (2017), for example, stated that they found it difficult to locate images suitable for their digital stories. The pre-service teachers in Røkenes (2016) cited concerns about employing copyrighted images in their digital stories. In another study, Shelton et al. (2017), the pre-service teacher participants stated they found the technical demands of creating their digital stories to be challenging. These were among the same challenges the participants of this dissertation cited. Participant 14, for example, found it challenging to find images without copyrights for her digital story, and Participant 5 considered learning how to use video editing software a challenge. The findings of these studies and the discoveries of this

dissertation suggest that teacher educators and/or researchers may want to prepare and take proactive measures to ensure that digital storytelling projects go smoothly. Investigating pre- or in-service teachers' experience with digital storytelling and assessing their competence with technology required to create digital stories, such as video editing technology, may help ensure that digital story projects are not overly challenging for participants. In future projects and studies, teacher educators, students, and researchers may also wish to explore privacy or ownership (e.g, copyright) issues, which Aşık (2016) addressed in his study, before beginning digital storytelling projects.

Classmates and groupmates. The participants discussed and directly addressed their classmates and digital storytelling groupmates in the online asynchronous discussion threads. They credited and thanked them for new knowledge they had acquired about educational technology. Multiple participants also described their classmates and other members of their doctoral program as a “family” or “community.” These discoveries are similar to those of other studies in Chapter 2 focusing on the use of discussion threads in teacher education. For example, the instructor in Hambacher et al. (2018b) employed self-introductions in online discussion threads at the outset of the course to promote a Community of Inquiry (Garrison, Anderson, & Archer, 1999). Similarly, the instructor of the course in this dissertation employed self-introductions at the outset of the school term to “get to know each other,” as he stated in the prompt for Week 1’s discussion. For the pre-service teachers in Hambacher et al. (2018b), another aspect that promoted a sense of community was engaging in online discussions with the same small groups of four or five students throughout the school term. While this dissertation’s participants interacted as one large group in their discussion threads, their digital storytelling projects were similarly small groups of four to five members. In the discussion threads I could

detect a sense of community among these digital storytelling group mates as they frequently credited and thanked each other for their contributions to their projects and for sharing knowledge. The study by Kalyaniwala-Thapliyal (2016), which I reviewed in Chapter 2, also focused on the community aspects of a digital storytelling project in language teacher education. The participants in this study, like those of this dissertation, generally found group work satisfying.

The discoveries of this dissertation and some of the studies I reviewed in Chapter 2, on the use of digital storytelling (e.g., Kalyaniwala-Thapliyal, 2016) or online discussion threads (e.g., Hambacher et al., 2018b) in teacher education, suggest that these types of course activities may promote a sense of community among group members. Community support, or online Communities of Inquiry in this case (Garrison et al., 2001; Hambacher et al., 2018b), may be particularly helpful for new teachers or teacher educators as they begin to engage in their professions. In addition to the support communities of pre- or in-service teachers offer each other, the discoveries of a study by Ng and Nicholas (2015), which I reviewed in Chapter 2, suggest that engagement in critical reflection through digital storytelling may promote teacher resilience. Engaging with peers in professional communities may also offer opportunities for pre- and in-service teachers to build discipline-specific knowledge or TPACK (Garrison et al., 2001; Hambacher et al., 2018b; Koehler & Mishra, 2009).

Participants' and other educators' ET knowledge and skills. As part of their course activities (e.g., online asynchronous discussion threads, digital storytelling) and the data collection methods I employed (i.e., survey, semi-structured interviews), the participants expressed beliefs about various topics related to knowledge of educational technology. The participants' discussions of the knowledge and skills necessary to employ educational

technology were similar to the focus of the two studies on digital storytelling involving TPACK (Koehler & Mishra, 2009; Mishra & Koehler, 2006) that I reviewed in Chapter 2, Aşık (2016) and Kildan and Incikabi (2015), and a study involving Digital Bildung (Krumsvik, 2014), Røkenes (2016). In these studies, the authors explored different types of teachers' knowledge: Technological, Pedagogical, Content (i.e., subject matter), and the types of knowledge at their intersections (e.g., Technological Pedagogical; Pedagogical Content; Technological, Pedagogical, Content) (Koehler & Mishra, 2009; Mishra & Koehler, 2006).

While the participants in this dissertation did not employ the term *TPACK* (Koehler & Mishra, 2009) anywhere in the data, they frequently discussed how teachers' knowledge of educational technology could help improve their teaching. However, the TPACK framework also stresses the importance of teachers' pedagogical (how to teach) and content knowledge, and how these interact with knowledge of technology. An explicit awareness of TPACK, which the participants may not have had, could have helped them to see how different kinds of teacher knowledge are intertwined. For example, the participants of this dissertation may have included a discussion of teachers' content knowledge (e.g., linguistics, grammar, literature) and how that relates to other types of knowledge teachers need. Furthermore, in their future teaching, the TPACK framework may help teacher educators, such as this dissertation's participants, create curriculum and learning experiences that develop teachers' knowledge of educational technology, pedagogy, and content matter (Koehler & Mishra, 2009). Possessing all three types of knowledge, along with knowledge at their intersections, is necessary for teachers, in turn, to help their L2 students learn (Mishra & Koehler, 2006).

This dissertation's participants indicated that participation in their course's digital storytelling project helped them improve their knowledge of educational technology. These

discoveries are consistent with some of the digital storytelling studies I reviewed in Chapter 2, including Aşık (2016), Kildan and Incikabi (2015), Kocaman-Karoglu (2016), and Røkenes (2016). The discoveries of this dissertation support the results of studies such as these that support the use of digital storytelling projects to improve pre- or in-service teachers' ET-related skills and knowledge. The preponderance of the relevant research literature, of which I am aware, suggests digital storytelling projects are generally effective learning activities in L2 teacher education programs.

Identities and roles of teachers and students. One of the themes in the digital stories related to the identities of teachers and students. Multiple studies in the field of teacher education, including some in this dissertation's literature review, have employed digital storytelling as a means to explore the identities of teachers (e.g., Kocaman-Karoglu, 2016; Lontas, in press-b; Matias & Grosland, 2016; van Galen, 2017). Matias and Grosland (2016), for example, employed digital storytelling to encourage pre-service teachers to critically reflect on race, privilege, and emotional distancing. In another study, Gachago (2016), who employed digital storytelling as a means for pre-service to explore their identities and social inequality, concluded that not only are digital stories a means to express their identifies, but they also act upon and influence those identities. However, while these studies focused on issues of race and inequity, the digital stories in this dissertation focused primarily upon the roles teachers and students play, or should play, in L2 learning contexts that involve educational technology. Lontas (in press-b), who also conducted research with the same participants in this study, found that "*digital stories with a twist* (or DS+)" (emphasis in original) (p. 66) were a particularly effective means for doctoral students to collaboratively engage in the negotiation and construction of language teacher identities.

In the data of this dissertation, the participants expressed views that education should switch from teacher-centered paradigms to student-centered approaches, and that teachers should play more of a supportive role while students take more control of and responsibility for their learning. The participants believed the affordances of ever-evolving technology would enable this shift, but the demands of students and the technological societies where they reside would also require it. Thus, the studies in the literature review in Chapter 2 and the findings of this dissertation both provide evidence that digital storytelling can be an effective means for education majors to critically explore various aspects of their identities.

The participants' beliefs about students and their identities were consistent with the findings in Hlas, Conroy, and Hildebrandt (2017), who surveyed and interviewed foreign language teachers across the US. Some of the foreign language teachers indicated that it was necessary to employ educational technology because students would have strong expectations to use it. The findings of Toffoli and Socket (2015) were also generally similar. In their study, the EFL teacher participants indicated they should employ educational technology at school because they believed many of their students had grown used to the use of technology through "Online Informal Learning of English (OILE)" (Toffoli & Socket, 2015, p 7). The participants in this dissertation also frequently stated that today's digital students, which they described as "digital natives" (Prensky, 2001), would strongly desire to use educational technology as technology was an integral part of their lives. The findings of this dissertation contribute to the body of literature which focuses on pre- or in-service teachers' understandings of student identities, particularly in regard to their interest in or involvement with educational technology.

Notions of change and adaptation. One of the themes present in the digital stories was the notion of *change*. In their digital stories, the participants frequently stated they believed

society and education were undergoing rapid changes in technology. They also stated that they believed these technology-related advancements required changes in teaching approaches. Group 1 addressed the notion of *change* in their digital story when arguing that *playing games* had been the primary means of learning humans have employed throughout their history, and that it has been only in recent times that education has involved teacher-centered instruction and lectures (Crawford, 2011). Group 1's argument, that game playing has been an integral part of learning for humans from the dawn of time, buttressed their claims that games should be a part of today's educational practices. Group 1 stressed that teacher-centered educational paradigms, in which educators impart knowledge to students, represent negative changes that lack evidentiary support about their effectiveness.

The notions of *change* and *acceptance* of technology were subjects of some of the studies I reviewed in Chapter 2. One example of a focus on change was the study by Orhan Goksun et al. (2018), who explored what pre-service teacher participants considered to be representative educational technologies of the past, present, and future by conducting document review (Bogdan & Biklen, 1998; Creswell, 2012) of infographics the participants created. However, Orhan Goksun et al. (2018) only sought to determine *what* the technologies were and did not explore the participants' subjective evaluations of those technologies, which makes its findings different from those of this dissertation. The participants in this study frequently expressed their subjective positions about innovations in educational technology. Another study in which the notion of *change* appeared was Vannatta and Fordham (2004), who found that in-service teachers' openness to change was one of the major factors predicting how frequently they would employ educational technology. In another study, Liu et al. (2017), who employed an adaptation of the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989), found that

EFL instructors were more accepting of technology if they had constructivist beliefs about learning. The findings of these studies are generally similar to the beliefs expressed by the participants in this dissertation, who perceived the urgency of technological and societal change and indicated a willingness to adapt to it. They also supported student-centered, Constructivist (Fosnot, 2005) approaches to education. One example is Participant 10, who expressed the need to accept change thus:

Just as people were initially convinced that ballpoint pens would be the downfall of American society, some critics feel that the use of technology in the classroom setting is "invasive" or distracting. I find that when an educator is able to adapt to their unique student population and engage them in ways they are comfortable and familiar, they find more success in student participation and success. In an ever-evolving global economy, our students will require multimedia skills in both their L1 and L2.

Discoveries about teachers' perceptions of change and willingness to accept it (e.g., Vannatta & Fordham 2004) are important to the fields of SLA and educational technology because research indicates that positive and progressive beliefs about educational technology may promote its effective use, as research by Deng et al (2014) suggests. Conversely, negative beliefs about educational technology may work as barriers to its implementation (Ertmer, 1999). The discoveries of this dissertation contribute to research related to these issues.

Multimodal expressions of meaning. One of the foci of the methods of this dissertation was the ways in which the participants' employed multiple semiotic resources (Andersen et al., 2015; Halliday, 1978; Unsworth, 2006), particularly in their digital stories, to express meaning about educational technology. In particular, applying multimodal concepts Unsworth (2006) developed to explore the image-text relations aided me in exploring the participants' beliefs

about types of educational technology they promoted in their digital stories. The resulting discoveries provided more depth of understanding than those I would have made with Constant Comparative Methods (Corbin & Strauss, 2008) alone.

Useful guidance for the multimodal exploration of the digital stories came from Bezemer and Mavers (2011) concept paper on multimodal transcription. Heeding their advice, in Chapter 1 of this dissertation I addressed my epistemological and theoretical beliefs to make it clear from which perspectives I approached the multimodal data. My epistemological and pedagogical beliefs are consistent with constructivism (Fosnot, 2005), Sociocultural Theory (Lantolf & Thorne, 2006; Vygotsky, 1978), and Systemic Functional Linguistics (Halliday & Matthiessen, 2014). I also followed Bezemer and Mavers' (2011) suggestion to identify what types of knowledge I sought from the data before beginning to transcribe, and to focus my transcriptions on the elements in the data that might provide the answers. To transcribe the data, I adapted the multimodal transcription template they offered in their article (see Figures 1 and 2).

The participants in this dissertation employed multiple modalities in their digital stories to express meanings, particularly still images, moving images (e.g., video clips, animation), narration, written language (screen text), and background music. With the modalities they *purposefully chose* (Kress, 2003) to include in their digital stories, they employed multiple types of strategies to express meaning, which I deductively explored with concepts from Unsworth's (2006) work on image-text relations. One of the strategies they primarily employed to express multimodal meaning was *ideational concurrence*, or the expression of the same or similar meanings with different modalities (Unsworth, 2006). Frequent examples of this in the digital stories were scenes in which the narration and text appearing on the screen were identical or similar. However, the participants also employed other types of *ideational concurrence*,

particularly *instantiation* and *exemplification* (Unsworth, 2006). *Instantiation* refers to one modality representing a single occurrence of a repeating activity to which the other modalities refer. *Exemplification* are situations in which one modality represents a relatively more specific example of other modalities. In many of these cases, one of the modalities (e.g., narration, screen text, image) was a specific instance or more specific example of another modality.

The multimodal data analysis of this dissertation shared some similarities with a study by Wu (2014), which I discussed in the multimodality section of Chapter 2. Wu (2014) employed theory based on SFL to explore the meanings expressed by images and written text in children's books. However, the concepts she employed were SFL's theories on the manner in which clauses complexes can expand upon each other's meanings (Halliday & Matthiessen, 2014). According to Wu (2014), images and text can *project* each other, with one serving to express the experience of thoughts or locutions, and the other expressing the contents of those thoughts or locutions. Another way modalities can expand on each other's meanings is for one modality to *enhance*, *extend*, and *elaborate* the meanings of another modality in a manner that is similar to what one clause may do for another in a clause complex. In another study involving multimodal analysis, the author, Yang (2012), similarly explored how multiple modalities can work together to express meaning. Yang deductively employed Kress's (2003) concepts of *transformation* and *transduction* to explore the meanings pre-service teachers expressed in digital stories. *Transformation* refers to alterations within one mode to create meaning (e.g., increasing the salience of an element in an image), while *transduction* indicates switching modes or employing more than one mode. Yang (2012) found that while the participants created their digital stories, they made *intentional* choices (Kress, 2003) regarding which modalities to employ "to enhance the message" (p. 227) and to make it easier for their audiences to understand their digital stories.

The notion of *intentionality* is important for researchers because participants' choices regarding modality use (e.g., which modalities to use and how to employ them) enact meaning in their multimodal ensembles (Kress, 2003).

While these studies, Wu (2014) and Yang (2012), involved multimodal analysis informed by research on clause relations (Halliday & Matthiessen, 2014) and choices regarding the transformation or employment of multiple modalities (Kress, 2003), my dissertation's multimodal analysis focused more on how images and texts can work *concurrently* to express similar ideational meanings (Unsworth, 2006). However, I believe the methodological approaches in Wu (2014), Yang (2012), and this dissertation all make contributions to the body of literature on how researchers may approach the analysis of data involving more than one modality. As L2 students increasingly communicate with multiple modalities, such as social media messages with embedded images, there is a need for more research involving multimodal analysis. Researchers, teacher educators, teachers, and students will benefit from a better understanding of how we employ multiple semiotic systems to communicate and from the development of metalanguage that enables discussions of these subjects. However, it may be beneficial to heed advice regarding multimodal research that Kohrs (2017) offered, which I discussed in the literature review in Chapter 2. She urged authors who research multimodality to be careful about adding so many new concepts to this field of research that it becomes confusing. She also suggested employing concepts from linguistics to explore multimodal data because the field of linguistics has a rich history of research supporting its theories.

Discussion of Research Question 3

In what ways do the doctoral students experience a digital storytelling project?

Research Question 3 focused on the experiences the participants had in a collaborative digital storytelling project, which represented 40% of the final course grade. Unlike Research Questions 1 and 2, which involved only one data set each, to answer Research Question 3, I explored all four of the primary data sets (discussion threads, semi-structured interviews, survey, digital stories). Employing Constant Comparative Methods (Corbin & Strauss, 2008), I could identify four themes in the data about their experiences. The first theme involved expressions that their experiences were positive. Most of the participants indicated they enjoyed the digital storytelling project and some stated they would like to work on similar projects again in the future. The second theme involved evaluations of the collaborative work they did on their project, which they believed were mostly positive. Group members showed appreciation to other group members for helping them and sharing knowledge. The third theme consisted of statements about the learning outcomes and personal benefits from participating in the digital storytelling project. Multiple participants indicated they had learned more about video editing tools and planned to use digital storytelling with their future students. The fourth theme were discussions of challenges the participants faced during the digital storytelling project. These included learning to use unfamiliar video software editing tools, time constraints, and matching group members' time schedules.

Positive project experiences. The participants indicated they enjoyed different aspects of the digital storytelling experiences, including editing the videos and collaborating with group members. Descriptive vocabulary they employed to describe their experiences included “fantastic” (Participant 14) and “great experience” (Participants 7 and 16). These discoveries are generally consistent with those of Kocaman-Karoglu (2016), whose participants found digital storytelling a motivational way to learn. The participants in Kalyaniwala-Thapliyal (2016), who

had freedom regarding the processes and subject matter of their digital stories, also had generally positive perceptions of their project. Along with studies such as Kalyaniwala-Thapliyal (2016), the discoveries of this dissertation add to the body of evidence suggesting that digital storytelling may be enjoyable and motivating learning experiences for education majors. Teacher educators may wish to consider adding digital storytelling projects to their courses if they deem them suitable for the students, the context, and course objectives.

Evaluations of collaboration. The participants frequently expressed evaluations of the collaboration aspects of their digital storytelling project. The discoveries of this dissertation regarding the participants' perceptions of collaboration with classmates are consistent with the findings of Kalyaniwala-Thapliyal (2016), who found that the pre-service teacher participants had contributed equally to the work in their digital storytelling project. The participants in this dissertation similarly reported satisfaction with the collaborative efforts of the members in their digital stories. This dissertation, along with studies such as Kalyaniwala-Thapliyal (2016), suggest that digital storytelling may be a way of promoting collaborative learning for education majors. Teacher educators may wish to consider both solo and collaborative digital storytelling projects as possible activities for their courses.

Outcomes and benefits from DS project. The discoveries for Research Question 3 regarding ways in which the participants believed they benefitted from their digital storytelling project are consistent with the findings of some of the digital storytelling studies I reviewed in Chapter 2. One example is the study by Heo (2009), who found that the pre-service teacher participants in her study had improved in their self-efficacy and dispositions toward educational technology. Other studies involving digital storytelling in teacher education provided evidence that these types of multimodal projects could contribute to the educational technology skills or

knowledge of pre- or in-service teachers. These studies included Kocaman-Karoglu (2016), Kildan and Incikabi (2015), and Røkenes (2016). However, while the findings of most studies I reviewed supported the notion that digital storytelling would improve pre- or in-service teachers' ET-related knowledge or skills, some did not provide such evidence. One example is another study by Heo (2011), who failed to find evidence that pre-service teachers had improved their educational technology self-efficacy. Conversely, the discoveries of dissertation were more similar to findings of the majority of the studies I reviewed in Chapter 2 (e.g., Kocaman-Karoglu, 2016, Kildan & Incikabi, 2015, Røkenes, 2016), which provided evidence that digital storytelling projects could have a positive impact on educational technology skills and knowledge. The participants of this dissertation generally indicated they had improved in their knowledge of educational technology. These discoveries of this dissertation and the majority of the studies I reviewed in Chapter 2 suggest that digital storytelling projects may be effective means for helping education majors improve their knowledge of educational technology.

Challenges faced. One of the themes in the participants' perceptions of their digital storytelling experiences was that they faced challenges during the process of creating their digital stories. The main challenges were the technical demands of creating and editing their digital stories with video editing software. However, they also faced other challenges, such as time limits and coordinating group efforts with busy group mates. These findings are consistent with the challenges participants noted in some of the studies on digital storytelling I reviewed in Chapter 2. The participants in Shelton et al. (2017), for example, noted that the technological demands and creating narration were challenging. In another study, Kildan and Incikabi (2015), the participants noted that finding images to use in their digital stories were one of the challenges. This was also the case for Participant 14 in this dissertation, who believed that it was

challenging to locate images and using proper citations “to avoid copyright issues.” These discoveries of this dissertation and reviewed studies suggest DS projects may be effective means for learning about ET.

Research Question 3 focused on the participants’ subjective evaluation of their digital storytelling project. Discoveries about these types of experiences may be valuable for teacher education because they can provide insight into whether digital storytelling or similar activities may help, or fail to help, pre- or in-service teachers explore, negotiate, critically analyze, and/or express meanings. Pre- and in-service teachers can employ digital storytelling for a variety of purposes, such as learning about subject matter or technology (e.g., Kocaman-Karoglu, 2016; Kildan & Incikabi, 2015, Røkenes, 2016), and exploring identities or social issues (e.g., Condy et al., 2012; Gachago, 2016; Gachago et al., 2014; Kocaman-Karoglu, 2016; Liontas, in press-b; Matias & Grosland, 2016). The discoveries of this dissertation support the use of digital storytelling as a means of developing knowledge about educational technology and a method for exploring identities and beliefs.

Discussion of Research Question 4.

How do the doctoral students perceive the use of educational technology in second/foreign language education?

The discoveries for Research Question 4, in a sense, encompass the findings of the other research questions because it is a relatively broad question about the participants’ perceptions of educational technology, which makes it similar to the other three research questions, and because it involves all four of the primary data sets (discussion threads, digital stories, survey, semi-structured interviews), unlike Research Questions 1 and 2, which include one data set each. To determine the participants’ perceptions of educational technology use in L2 education, I

inductively explored the data with Constant Comparative Methods (Corbin & Strauss, 2008) and deductively explored them with multimodal theoretical concepts from Unsworth's (2006) work on image-text relations. Through these data exploration processes, I was able to identify three major categories of perceptions in the data: rationales for implementation and employment of educational technology in L2 education; beliefs about characteristics of specific types of educational technology (e.g., AI, CAT, immersive technologies, educational games, annotations); and knowledge related to educational technology. In the following sections, I present discussions for each of these three categories of ET-related perceptions.

Rationales for ET implementation and use. The first perception involved beliefs about rationales for the implementation and use of educational technology. The participants frequently expressed beliefs that teachers should have purposes and learning objectives in mind when making decisions regarding the implementation and use of educational technology. They also stressed that effective use of educational technology requires consideration of context and learner characteristics. The participants frequently cited the course instructor, course readings (e.g., Chapelle, 1998; Lontas, 2001b, 2018b), and course materials as support for these beliefs. They also frequently discussed the *pros* and *cons* of educational technology in general, with the latter serving as rationales for its use.

Dissertation discoveries related to rationales for ET implementation and use were generally consistent with some of the studies on teacher cognition I discussed in the literature review in Chapter 2. One example is Kim et al. (2013), who found that student-focused epistemological beliefs and actual classroom practices correlated with perceptions of technology as a means of learning rather than as a goal itself. Similarly, the participants in this dissertation frequently stressed the need to focus on students and expressed beliefs that teachers should use

educational technology purposefully and to achieve learning objectives. Another example of related research I covered in the literature review is Deng et al. (2014), who conducted a study with in-service high school teachers. Deng et al. (2014) found that teachers who had progressive beliefs about sources of academic knowledge also believed teachers should use educational technology in a constructivist manner (Windschitl, 2002). In a similar fashion, the participants in this dissertation tended to express support for student-centered learning that involves educational technology, as opposed to teacher-centered transmission paradigms. They saw the role of teachers as being something more akin to supportive guides than being sources of knowledge. They wanted the students to discover and construct knowledge for themselves, rather than being passive recipients of knowledge from teachers. Some participants (e.g., Participants, 5, 13) also perceived educational technology as a means to enable students to become life-long learners, and Participant 5 indicated a goal of hers was to introduce educational technology to students so they could become independent learners.

Research further indicates that teacher cognitions, including beliefs, may have an impact on classroom practices (Borg, 2006, 2018). A common focus among studies I reviewed in Chapter 2 was to explore the (in)consistencies between the beliefs and practices of pre- and in-service L2 teachers (e.g., Farrell & Guz, 2019; Oranje & Smith, 2018; Öztürk & Yıldırım, 2019; Şakrak-Ekin & Balçıkanlı, 2019; Sato & Oyanedel, 2019). While, I only collected some self-reported data (interview questions and survey items) on planned ET practices, the participants generally indicated that they would employ educational technology in a manner that is consistent with the beliefs they expressed. Most of the participants expressed epistemological and pedagogical views that were learner-centered and consistent with the tenets of constructivism

(Fosnot, 2005; Stabile & Ershler, 2015), which was similar to the views of the high school teacher participants in Deng et al. (2014).

The discoveries of this dissertation suggest that course activities in teacher education, such as digital storytelling and online asynchronous discussion threads may be effective methods for pre- or -in-service teachers to explore rationales for the use of educational technology in L2 education. While I did not focus on collecting data to explore (in)consistencies between pre- or -in-service teachers' beliefs and practices, teacher educators and researchers may wish to consider their use as research by authors such as research by authors such as Farrell and Guz (2019), Farrell and Yang (2017) suggest that reflection on practice can be beneficial for pre- and -in-service teachers. The discoveries of this dissertation add to the body of literature supporting digital storytelling and online asynchronous discussion threads as useful methods for reflection, which can also help transform learning experiences into academic knowledge (Beard & Wilson, 2013).

Beliefs about characteristics of specific types of ET. Another major category of ET perceptions present throughout much of the dissertation data involved the participants' beliefs about characteristics of specific types of educational technology, primarily AI, annotations (e.g., glosses), CALL, CAT, educational games, Google Apps (particularly Docs, Slides, and Forms), and immersive technologies (AR, VR), and LMS. The participants expressed their opinions about the *pros* and *cons* of these technologies, and argued for or against their use in L2 education. The majority of the participants, however, had positive perceptions of these educational technologies, and believed teachers could implement them effectively if they had a good understanding of the context and their students, and possessed the requisite technological knowledge.

While some of the studies I reviewed in Chapter 2 on pre- or in-service teachers' perceptions or use of educational technology focused on education technology in general instead of specific types of educational technology, others had more specific focuses. For example, Vannatta and Fordham (2004) collected quantitative data about in-service teachers' beliefs and use of a variety of technologies, including computers, digital cameras, and presentation software. Toffoli and Socket (2015) focused on students' "Online Informal Learning of English (OILE)" (p. 7). Other authors, including Hlas et al. (2017), Alsuhaibani (2019), and Canals and Al-Rawashdeh (2019), explored or discussed the CALL use of pre- or in-service service instructors. Teachers' attitudes toward computers was the focus of a study by González-Carriedo and Esprivalo Harrell (2018). However, unlike these studies, this dissertation, which involved the exploration of four different sets of qualitative data, shed light on educators' beliefs about both educational technology in general and various types of specific educational technologies (e.g., immersive technologies, AI, LMS, Google Apps). As different technologies offer different affordances, and some may be more suitable for some contexts than others, research such as this dissertation, which explores participants' perceptions of different kinds of educational technology, may shed relatively more useful insight than those with a relatively broad focus. Educators and researchers may want to be careful not to generalize knowledge about one type of technology to others.

Educational technology-related knowledge. The third major category of perceptions of ET use in the data involved the ET-related knowledge of the participants and other educators. The participants believed that they and other educators need to have sufficient knowledge of educational technology in order to employ it effectively. The participants discussed the educational technology knowledge they possessed or lacked before the course, the ET

knowledge they acquired in the course, and the types of ET knowledge they wished to acquire in the future. They also stressed that teachers, in general, should learn about educational technology in order to help their students, who they described as *digital natives* (Prensky, 2001), acquire competence with the target language and culture. They furthermore argued that teachers should receive support from their schools to develop their technological knowledge. For the participants, understandings of educational technology, along with knowledge of context and students, were requisites for being able to employ educational technology effectively and efficiently.

Research on pre- or in-service teachers' ET knowledge or skills deserves attention in the field of SLA because explorations of these subjects, including studies I reviewed in Chapter 2, have indicated that ET capabilities and knowledge can have an impact on the ET-related beliefs and practices of educators. These subjects, the ET-related knowledge, beliefs, and practices of teachers, are critically important because educational technology use has come to play a major role in L2 education (Otto, 2017), and because there are pressures on teachers, of all disciplines, to develop ET capabilities (Adams Becker et al., 2017) and to adapt their teaching roles to student-centered education paradigms that educational technology facilitates (Adams Becker et al., 2016).

Some of the studies I reviewed in Chapter 2 and the discoveries of this dissertation and indicate that teachers' ET knowledge is a subject of interest shared among researchers, teacher educators, teachers, and pre-service teachers. Multiple studies I reviewed in Chapter 2 focused on pre- or in-service teachers' ET knowledge (e.g., Aşık, 2016; Heo, 2009, 2011; Kildan & Incikabi, 2015; Kocaman-Karoglu, 2016, Røkenes, 2016) or ET self-efficacy (e.g., Heo, 2009, 2011; Joo et al., 2018). Some of the participants of this dissertation, and some of the pre- or in-service teachers in the studies, indicated they desired more ET knowledge or believed their ET

knowledge was inadequate. The majority of pre-teacher candidates in Kildan and Incikabi (2015), for example, believed that prior to engaging in a digital storytelling project, their TPACK (i.e., the intersection of technological, pedagogical, and content knowledge) (Koehler & Mishra, 2009) was inadequate for teaching mathematics. The participants in this dissertation also frequently expressed desires to learn more about educational technology. For example, Participant 7, discussing her learning aspirations for the course, stated,

I want to become familiar with the research on the CALL tools that I used in the past and I want to learn about new tools that I have not used before. I am hoping to discover new and better ways of practicing widespread tools.

As these examples demonstrate, the degree of ET knowledge pre- or in-service teachers possess is an object of attention for researchers, teacher educators, teachers, and education majors. Multiple pre- or in-service teachers, including some in this dissertation and some in the studies I reviewed in Chapter 2, believe their ET knowledge was inadequate for teaching purposes. The fields of education, in general, and L2 education, in particular, would benefit from more research into ways of improving teachers' ET knowledge.

Another category of discoveries this dissertation and many of the studies I reviewed in Chapter 2 (Aşık, 2016; Heo, 2009; Kildan & Incikabi, 2015; Kocaman-Karoglu, 2016, Røkenes, 2016), with the exception of Heo (2011), shared was a belief by the participants that digital storytelling had improved their knowledge of and/or self-efficacy with educational technology. Pre-service teachers' in Heo (2009), for example, indicated their confidence with educational technology was higher following the completion of a digital storytelling project. In another study, Kildan and Incikabi (2015), pre-service teachers believed their TPACK improved from creating digital stories in a course. This dissertation's participants similarly believed their ET

knowledge and skills had improved. One example is Participant 4, who stated she “learned how to combine audio, images etc. The creation in general of the story.”

One factor that may have contributed to the participants’ learning outcomes from their digital stories is that they had the opportunity to reflect on their experiences in the online asynchronous discussion threads. Research on experiential learning, such as that by Beard and Wilson (2013), who I discussed in Chapter 1, suggests reflection promotes the acquisition of knowledge from learning experiences. While none of the studies on online asynchronous discussion thread use in teacher education that I reviewed in Chapter 2 focused on digital storytelling or knowledge of educational technology, some of them provided evidence that discussion threads promote critical thinking (e.g., Chieu & Herbst, 2016; Chieu et al., 2015; Szabo and Schwartz, 2011) and collaborative knowledge construction (e.g., Batarelo Kokić & Rukavina, 2017; Johnson et al., 2017). These discoveries suggest that opportunities for pre- or in-service teachers to engage in critical thinking and collaborative knowledge construction, which online asynchronous discussion threads promote, may help participants in digital storytelling projects to create and consolidate knowledge. While I did not purposefully collect much data on the participants’ perceptions of their online discussion thread experiences, it is probable their course’s discussion threads served as opportunities to reflect on, negotiate, and consolidate their new knowledge. Research explicitly focusing on digital storytelling and discussion threads as a means for reflection may be particularly fruitful in future SLA research.

Summary

In Chapter 4, I delineated the discoveries for the four *a priori* research questions which guided this dissertation’s research. Research Question 1 focused on the educational technology-related themes that appeared in the course’s discussion threads. The themes I identified were the

characteristics of both educational technology in general and specific types of educational technology; the participants' and other teachers' ET-related skills and knowledge; the dynamics of L2 learners and educational technology; employing educational technology to learn second/foreign languages; and the participants' doctoral course. Research Question 2 was similar to Research Question 1 in that it focused on the educational technology-related themes that appeared in the digital stories that the participants collaboratively created as a course assignment. I began my delineation of the discoveries for Research Question 2 with a description of the members and contents of the four groups' digital stories. I then described the three encompassing themes I discovered in the data, which were the impact of ET use on the processes, products, and learners in L2 education; identities and roles of teachers and students; and the notions of *change* and *adaptation*. Research Question 3 focused on the participants' experiences with a collaborative digital storytelling project. The four experience-related themes I discovered in the data were positive project experiences; group work and collaboration; the benefits of participation in the digital storytelling project; and challenges the participants faced in the process of creating their digital stories. With Research Question 4, I sought to explore the participants' perceptions of educational technology use in L2 education as they expressed them in the four primary data sets. The following are the three encompassing themes I discovered among their perceptions: rationales for the implementation and employment of educational technology; the characteristics of specific types of educational technology; and the ET-related knowledge of the participants and other educators.

After delineating the findings for the four *a priori* research questions, I then presented discussions for each research question. In these discussions, I linked the discoveries to the

literature I reviewed in Chapter 2. Finally, I discussed the implications of this study's findings in light of the extant literature.

This dissertation contributes to the body of literature on language teacher cognition. In particular, it may call attention to the need to focus on the educational technology-related beliefs of doctoral students in the field of second language acquisition, who are likely to become researchers and/or L2 teacher educators. Understanding what they believe about educational technology may help researchers see trends in future research and pedagogy in the field of L2 education.

CHAPTER 5: CONCLUSION

Introduction

With this dissertation, I sought to explore the ET-related beliefs of doctoral students who were enrolled in a course on the subject of ET use in L2 education. The participants were members of a doctoral program whose focus was second language acquisition and educational technology. While research in the field of education indicates that teacher beliefs have an impact on classroom use of educational technology (e.g., Deng et al., 2014; Hismanoglu, 2012; Joo et al., 2018), a review of the extant literature indicates few studies exist on the ET-related beliefs of doctoral students in the field of second language acquisition who are likely to become teacher educators and researchers after they graduate. Their future work in these roles may, in turn, influence how pre- and in-service L2 teachers perceive and employ ET in classrooms with their own students. To explore the participants' ET-related beliefs in depth, I employed a qualitative exploratory descriptive case study design to examine the four primary data sets of this dissertation, which were online asynchronous discussion threads, semi-structured interviews, a digital survey, and digital stories the participants collaboratively created. However, as nine of the 33 items in the survey were Likert-scale, this dissertation also includes a relatively small portion of quantitative data. In the following sections of Chapter 5, I summarize the discoveries, and then discuss pedagogical implications, limitations, and recommendations for future practice and research. I then conclude Chapter 5 with final remarks.

Summary of Discoveries

In this section I briefly cover my research with respect to each of the four *a priori* research questions, all of which related to the participants' expressions of beliefs about educational technology. To discover answers for the first two research questions, I explored the ET-related themes in the discussion threads (Research Question 1) and digital stories (Research Question 2). While the third research question addressed the participants' perceptions of a digital storytelling project, the focus of the digital stories themselves consisted of rationales for employing different types of educational technology groups of the participants chose to promote. With the fourth research question, which involved all four primary data sets, I sought to explore how the participants perceived the use of educational technology in L2 education. In the following sections of Chapter 5, I provide a brief summary of the discoveries for each research question.

Research Question 1: What are the educational technology-related themes embedded in the doctoral students' discussion threads?

Over the six weeks of the summer course, the participants discussed a wide variety of topics in their weekly asynchronous online discussion threads. The five main themes I identified in the discussion threads were characteristics of ET in general and specific types of ET, ET-related skills and knowledge of both the participants and pre- or in-service teachers, the dynamic relationships between L2 learners and educational technology, employing educational technology to learn L2, and experiences in the participants' doctoral course. In general, the participants negotiated and expressed beliefs that teachers, including themselves, need to learn about educational technology in order to be able to employ it effectively with today's *digital*

natives (Prensky, 2001). The participants also frequently emphasized that educational technology implementation and use should be purposeful and help achieve learning objectives.

Research Question 2: What are the educational technology-related themes embedded in the doctoral students' digital stories?

In groups of four or five, the 17 participants created four digital stories to promote a type of technology of their choosing. The three major themes I identified in their digital stories were beliefs about the following: (1) the impact of ET use on the processes, products, and learners in L2 education; (2) the identities and roles that teachers and students play; and (3) notions of *change* and *adaptation*. As their digital stories served as promotional videos for L2 teachers' professional development, the participants stressed the *pros* of educational technology use in general, along with the strengths of the specific types of educational technology upon which they chose to focus. The participants also believed that educational technology use could promote student-centered education. In addition, a theme throughout the digital stories was that ongoing technological advancements necessitate changes and adaptations to pedagogical approaches.

Research Question 3: How do the doctoral students perceive a digital storytelling project?

Research Question 3 focused on the participants' involvement with one of the four primary data sources of this dissertation, which was also a course assignment representing 40% of the final grade. I could identify four themes related to the participants' digital storytelling experiences: (1) positive experiences the participants had during their digital storytelling project; (2) evaluations

of collaboration and group mates; (3) perceptions of the outcomes and benefits from participating in the digital storytelling project; and (4) challenges the participants faced during the digital storytelling project. The participants indicated they had generally positive experiences during the project and learned much about educational technology from their project mates and through their own efforts. Challenges included learning about technology needed to create their digital stories and aligning work schedules with other participants.

Research Question 4: How do the doctoral students perceive the use of educational technology in second/foreign language education?

I identified three overarching themes throughout the four primary sets of data. These were study participants' (1) rationales for the implementation and use of educational technology; (2) beliefs about the characteristics of specific types of educational technology; and (3) the educational technology-related knowledge of the participants and other educators. The participants held different beliefs about the *pros* and *cons* of different types of educational technology, which they employed as reasons in arguing *for* or *against* the use of those technologies. They also stressed that understandings of context, students, and learning objectives were important in order to make the correct decisions regarding the implementation and use of educational technology. The participants frequently stated educational technology use needed to be purposeful. They also believed it was important for educators, including themselves, to learn how to employ educational technology and suggested that schools provide them with the requisite support.

Implications

In this section I discuss the implications of this dissertation. I believe the work has the potential to contribute to research in the fields of second language acquisition and educational technology in two ways. One is that it may add to knowledge regarding the ET-related beliefs of doctoral students who are likely to become teacher educators and/or researchers in the near future. I believe this research has value because their ET-related beliefs may impact curriculum they design and implement for future L2 teachers. What these future L2 teachers experience and learn in the participants' education classes, in turn, has the potential to influence the way they employ educational technology with their own L2 students (Heo, 2009, 2011). Future research on educational technology the participants conduct may also have an impact on the fields of SLA and/or educational technology.

Another potential contribution of this dissertation in the fields of second language acquisition and educational technology relates to the methodology I employed. To my knowledge, little to no research exists which employs the same combination of data types and data analysis methods. For example, while multiple researchers have explored the ET-related cognitions of pre- or in-service teachers (e.g., Joo et al., 2018; Orhan Goksun et al., 2018; Yerdelen-Damar et al., 2017), including those in the field of L2 education (e.g., Canals & Al-Rawashdeh, 2019; Hlas et al., 2017; Toffoli & Socket, 2015), to my knowledge, few have explored the ET-related beliefs of doctoral students in the field of second language acquisition. Furthermore, while multiple studies have involved some of the same types of data I employed, such as multimodal texts (e.g., Orhan Goksun et al., 2018; Wu, 2014), digital stories (e.g., Gachago, 2016; Røkenes, 2016), and discussion threads (e.g., Chieu et al., 2016; Johnson et al., 2017), as far as I am aware, few to none have employed the same combination of data sets in this

dissertation: digital storytelling (or other multimodal texts), discussion threads, interviews, and surveys. Future researchers in similar fields may wish to consider employing multiple modes of data, including digital stories, to develop a deeper understanding of their research topics.

I believe the findings of this dissertation have implications for education. Research indicates that reflection on beliefs, practices, and how beliefs influence practices can aid teachers in improving how they teach (Farrell & Guz, 2019; Farrell & Yang, 2018). Reflection offers opportunities for teachers to better understand their beliefs and practices, if their beliefs and practices align, and reasons for their (dis)alignment (Farrell, 2015). In the participants' coursework, particularly the discussion threads and digital stories, they frequently negotiated and expressed their beliefs about educational technology and L2 education. Collaboratively creating digital stories, which served to promote different types of educational technology, and engaging in discussion thread dialogues with prompts directing the discussants to engage in reflection, helped this dissertation's participants reflect on their educational technology beliefs and practices. Teacher educators may also want to consider how they can implement similar course activities that encourage pre-service teachers to reflect on their beliefs and practices, along with how the two relate. A combination of digital storytelling and online asynchronous discussion threads, with the latter as a means of reflecting on the former, may prove particularly effective for both teacher educators and researchers.

Another implication of the discoveries is that L2 teachers need to learn about educational technology so that they can critically evaluate the roles it may play and the objectives it may help to achieve. The participants frequently stated that educational technology use should be purposeful and that teachers should know how to employ it effectively. With critical thought about learners, contexts, learning objectives, and the *pros* and *cons* of available educational

technology, educators can design and implement effective curriculum for their L2 students. One way for L2 teachers and teacher educators to develop this kind of critical thinking is to engage with other L2 teachers in communities of practice (Borg, 2006; Bruzzano, 2018; Johnson, 2006; Shulman & Shulman, 2004), within which they can negotiate meaning, share knowledge, and mutually support each other. The participants in this study frequently mentioned the supportive nature of their classmates and academic program, and some of them (e.g., Participants 4, 10, 12, 13, 14) referred to their peers as “family.”

It would be also useful for doctoral students in the field of SLA, as well as other L2 education majors, to become aware of the TPACK model (Mishra & Koehler, 2006; Koehler & Mishra, 2009). Knowledge of technology itself may not be sufficient for teachers to employ it effectively in L2 education. Instead, as Mishra and Koehler (2006) pointed out, teachers require knowledge on how to employ ET to teach content material. With the focus the TPACK framework will help enable, teachers are more likely to employ ET effectively for pedagogical purposes to achieve learning objectives.

Limitations

There are multiple limitations in this inquiry, including those related to my subjective interpretations of the data and the research methods I employed in this dissertation. Hermeneutic considerations dictate others may interpret the data differently than I did because I approached the exploration of the qualitative data from my own epistemological and theoretical perspectives (Richards, 2016). I believe learning is most effective when it occurs in conditions consistent with the tenets of constructivism (Fosnot, 2005) and Sociocultural Theory (Lantolf & Thorne, 2006; Vygotsky, 1978), which postulate people construct knowledge through the mediation of other people and culture. I also agree with Post-Positivist and Post-Structuralist views that posit

perceptions of knowledge are subjective and dependent on context (Court, 2018; Denzin & Lincoln, 2005b; Richardson & St. Pierre, 2005; Tracy, 2012). Other theories that fundamentally inform my understandings of knowledge, language learning, and learning in general, include Halliday's (1993) language-based theory of learning (LBTL) and Systemic Functional Linguistics (Eggins, 2004; Halliday & Matthiessen, 2014). These theories locate language at the core of human's negotiation, expression, and construal of meaning. I agree with Halliday, who viewed human linguistic development and cognitive developing as being one and the same. The following quote of his, which I employed in Chapter 1, bears repeating: "the ontogenesis of language is at the same time the ontogenesis of learning" (Halliday, 1993, p. 93). Researchers who have different epistemological and theoretical beliefs may have interpreted this dissertation's data in ways different from me.

Other limitations of this dissertation relate to the methods I employed. There was a time gap between when I conducted digital surveys and semi-structured interviews and when the participants were enrolled in the course. The students took the course on educational technology use in second and foreign language education during the summer of 2018, but I conducted interviews with the students in the spring of 2019. Due to the time gap, a possibility exists that the participants may not have had entirely clear memories of the details of their course.

Another limitation of this dissertation is that I did not collect many data that would have allowed me to compare educational technology-related beliefs to classroom practices. I asked relatively few questions about ET-related practices, data which represent self-reports and not observations of actual practice. This makes my dissertation different from some language teacher cognition studies that I reviewed in Chapter 2 (e.g., Farrell & Guz, 2019; Öztürk & Yıldırım, 2019; Şakrak-Ekin & Balçıklı, 2019; Sato & Oyanedel, 2019), which collected data about both

beliefs and practices in order to make comparisons between the two. While research such as this dissertation may provide valuable insight about (future) educators' beliefs, studies based upon both beliefs and practices may shed light on how the former influence the latter. This point is important to me because my ultimate research goals are to make pedagogical contributions to the field of SLA that may help improve teacher practices.

Recommendations for Future Research

Conducting this dissertation has provided me opportunities to reflect on my research methods. I recommend that future researchers continue to follow the lead of authors who have collected data on both the beliefs and practices of pre- and in-service language teachers (e.g., Farrell & Guz, 2019; Öztürk & Yıldırım, 2019; Şakrak-Ekin & Balçıklanlı, 2019; Sato & Oyanedel, 2019). Data on both beliefs and practices would help researchers determine how much influence the former has on the latter. Researchers may also want to conduct observations of practices, similar to the methods of Farrell and Guz (2019) and Farrell and Yang (2017), instead of relying on only participants' self-reports about practices because the participants may not always have an accurate understanding of their own teaching methods. Furthermore, while multiple studies exist on pre- and in-service language teacher beliefs (see Table 1), there appear to be few studies in the extant literature involving doctorate students who are likely to become researchers and/or teacher educators in the field of SLA. Research on future L2 researchers' and teacher educators' beliefs, in a wide variety of contexts, would therefore be of benefit to the field. In addition, longitudinal research focusing on doctoral students' beliefs and practices, and how they change over time during their studies or throughout the early stages of their careers, could also provide deeper insight into the impact of beliefs on practices.

Employing multiple types of data, as this dissertation did, may also help researchers better understand the educational technology beliefs of pre- and in-service teachers. This is particularly the case for multimodal data, including the types of digital stories in this dissertation, as they may allow researchers to explore participants' beliefs in more depth (Richards, 2006). However, in order to conduct effective research involving multimodal data, I believe there is a need for researchers to first develop an understanding of multimodal concepts and the metalanguage they would need to describe their methods and report their findings. Unsworth's (2006) work on image-text relations, and the works of other authors in the field of multimodal, such as Kress and van Leeuwen (2006) and Serafini (2014, 205), may also prove useful.

My experiences conducting the research for this dissertation and writing the discoveries has raised questions in my mind that future research may help answer. I compiled a list of four questions regarding possible directions for future research.

- In what ways may a focus on understandings and applications of multimodal theoretical concepts, along with relevant metalanguage, promote multimodal literacy pedagogy in the field of L2 education.
- How may research promote multimodal literacy in L2 education?
- What ways might be available to help improve the exploration of multimodal data? For example, how might we improve multimodal data transcription? What means are available to code multimodal data? What types of theories or concepts might help us deductively explore multimodal data?
- In what ways do L2 teacher educators' and future L2 teacher educators' beliefs about ET correlate with or influence the ways in which they (will) employ ET in courses they (will) instruct? In what ways do their ET beliefs influence their research?

Recommendations for Practice

Conducting this dissertation has provided me with opportunities to reflect on the coursework in which the participants engaged and consider how teacher educators can apply lessons I have learned in their own courses. Research shows reflection improves pre-service education and in-service teacher professional development (Farrell, 2015, 2018). In addition, reflection is an effective means for pre- and in-service teachers to understand their beliefs and practices, and provides an opportunity for pre- and in-service teachers and researchers to explore how the two may influence each other (Farrell & Guz, 2019; Farrell & Yang, 2017). Research on experiential learning by authors such as Beard and Wilson (2013) also stresses that students create new knowledge when they reflect on their learning experiences, which would be teaching in the case of pre- or in-service teachers. Therefore, teacher educators might consider developing coursework that engages students in the reflexive examination of their beliefs, knowledge, and practices. The discussion threads and digital storytelling project (i.e., *DS+*) the course instructor employed in this dissertation are effective methods for reflection, as the discoveries of this dissertation demonstrated. Discussion threads offer opportunities for students to engage in the negotiation and interpretation of meaning as they collaboratively construct new knowledge (Hambacher et al., 2018b; Johnson et al., 2017). Discussion threads also engage education students in critical thinking (Chieu & Herbst, 2015??; Johnson et al., 2017; Szabo & Schwartz, 2011). Research by Szabo and Schwartz (2011), for example, found that education majors who engaged in discussion threads engaged in higher levels of thinking on Bloom's revised taxonomy (Anderson & Krathwohl, 2001) than students who had not participated in those discussions.

The discoveries of this dissertation also indicate digital storytelling, or *DS+*, can engage students in reflection, critical thought, and the construction of new knowledge. The *DS+* project

in this dissertation helped participants employ higher order thinking as the instructor encouraged them to apply rhetorical logic, in particular *logos*, *ethos*, *sylogism*, and *enthymeme* (Liontas, in press-b), in the construction of their arguments for the use of different types of ET. Furthermore, as a multimodal project, it enabled students to explore and express meanings they may not be able to with words alone (Richards, 2006). Multiple studies have demonstrated that digital storytelling is useful for reflection on topics such as identity (e.g., Gachago, 2016; Kocaman-Karoglu, 2016; Liontas, in press-b; Matias & Grosland, 2016) and social issues (e.g., van Galen, 2017). Other studies have pointed out how projects in which pre-service teachers created didactic digital stories have served to promote pre-service teachers' educational technology knowledge and skills (e.g., Aşık, 2016; Göçen Kabaran & Alkan Karademir, 2017; Heo, 2009; Kildan and Incikabi, 2015). Digital storytelling projects in teacher education courses also serve as models for the types of activities pre-service teachers may wish to try with their students. Therefore, I recommend ~~that~~ teacher educators consider employing multimodal projects, such as *DS+*, that promote creativity, critical thinking (Anderson & Krathwohl, 2001), and the collaborative construction of knowledge, and couple them with other activities, such as discussion threads, to promote critical reflection and the creation of communities of practice (Borg, 2006; Bruzzano, 2018; Johnson, 2006; Shulman & Shulman, 2004).

I also recommend L2 teacher educators consider employing the TPACK model, which Mishra and Koehler (2006) developed from Shulman's (1987) discussions of "pedagogical content knowledge" (Shulman, 1987, p. 19), in course curriculum design. TPACK, which stands for "technology, pedagogy, and content knowledge" (Koehler & Mishra, 2009, p. 60), is a framework that suggests teachers, or doctoral students in the case of this dissertation, need to acquire not only knowledge about ET, pedagogy, and content material, but also an understanding

of the intersections of these types of knowledge. The need for educators to develop ET-related knowledge is stressed by ISTE (2020), which has developed educator standards. ISTE (2020) calls on “[e]ducators [to] continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning” (<https://www.iste.org/standards/for-educators>). By employing the TPACK model, (future) teacher educators, including the doctoral students in this dissertation, come to understand that they need to know how to employ ET to teach (i.e., the *TP* of *TPACK*), and, more specifically, how to employ ET to teach content knowledge (i.e., *TPACK*) (Koehler & Mishra, 2009).

My work on this dissertation has also led me to consider practice-related questions, the answers to which can help advance the field of L2 teacher education. The following are four pedagogy-focused questions teacher educators in the field of L2 education may wish to consider:

- In what ways can teacher educators employ digital storytelling projects, DS+, or similar types of multimodal projects, to engage doctoral students in critical thought regarding topics such as the use of ET in L2 education? How can teacher educators design and create prompts or directions for these types of activities to ensure they promote critical thinking?
- In what ways can the dynamics between or among different types of learning activities, such as digital storytelling project and online discussion threads, promote reflection, critical thinking, and the (collaborative) construction of knowledge?
- What kind of course activities can teacher educators design and implement to help education majors develop their knowledge of not only ET, but how to employ ET to teach content material (i.e., *TPACK*)?

- In what ways can teacher educators assess the degrees to which students have engaged in reflection, critical thinking, and the (collaborative) construction of knowledge? How can teacher educators assess the learners' outcomes of reflection, critical thinking, and the (collaborative) construction of knowledge?

Final Remarks

To this point in Chapter 5, I have summarized the dissertation's findings, discussed pedagogical implications, limitations, and recommendations for future research and pedagogy. In this last section of the last chapter of this dissertation, I first make final remarks regarding the context, processes, and products of this dissertation's research. Then, I offer personal reflections on what this journey has meant to me.

Educational technology now plays a significant role in L2 education (Otto, 2017). However, having access to hardware, software, and the internet does not guarantee that teachers and students will employ educational technology effectively. Similarly, teachers' familiarity with technology use in daily life does not mean they will be able to employ it effectively for pedagogical purposes (Koehler & Mishra, 2009). For educational technology to have a positive impact on L2 acquisition, as the participants in this dissertation pointed out, teachers need to possess the necessary skills and knowledge, and have a thorough grasp of their students, the context, and learning purposes and objectives. The discoveries in this dissertation indicated that for the participants, influences on L2 teachers' decisions regarding which types of technology to implement, and the manner in which to employ them, include perceptions and beliefs about educational technology, learning approaches, and the roles of students and teachers. As this dissertation's participants are likely to become researchers and/or teacher educators after they graduate, their beliefs may have an impact on future L2 teacher education and research, and

they may be among the academics who influence the future of SLA and ET pedagogy and research. Therefore, I believe this dissertation, as both an exploratory and descriptive case study, has made contributions to the fields of SLA and educational technology. This dissertation may serve to point out the need for more research with similar participants and offer ideas about which methods may be suitable or unsuitable.

This dissertation also provided evidence that digital storytelling projects, especially those that require logical argumentation, such as this dissertation's DS+, can engage doctoral students in critical thought regarding the use of ET in L2 education (Liontas, in press-b). By encouraging doctoral students to employ rhetorical logic (e.g., ethos, logos, syllogism) in their arguments for the use of particular types of ET (e.g., AR, Google Apps, LMS) (Liontas, 2020; in press-b; personal communication, July 15, 2020), teacher educators can help future teacher educators, along with other education majors, deepen their understandings of reasons for or against the implementation and employment of ET in L2 learning contexts. In addition, as was the case with this dissertation's participants, the multimodal affordances of digital storytelling (e.g., use of music, images, dramatizations) enables doctoral students to express meanings, including emotions, that might be difficult to express with written or spoken language alone (Richards, 2006). The DS+ project furthermore provided evidence that group multimodal projects offer opportunities for doctoral students, as well as other education majors, to engage in the collaborative negotiation and construction of meaning as they begin to develop communities of Communities of Inquiry (Garrison, Anderson, & Archer, 1999). Throughout the data the participants expressed gratitude for the knowledge they had gained from their classmates and DS+ project mates, and multiple participants appreciated being accepted into a community of learners.

On a personal level, this dissertation represents the culmination of study, research, and mentoring I have experienced in an academic community focused on Second Language Acquisition (SLA) and educational technology. My interests in SLA in general, and SFL and multimodality in particular, have led me to believe that it is important to study the ways in which people employ language, along with other modalities, to negotiate, construe, and express meaning. I believe, in effect, it is through language that we collectively construct ourselves and our perceptions of the world around us. Language is more than a medium for expressing our versions of reality; it is a means for its construction. Therefore, I believe that it is counterproductive to separate the study of language from the study of subject matter (e.g., History, Math, Science, Language Arts). It is my hope that this dissertation will be a first step for me in promoting research and pedagogy that focuses on how people employ language and other modalities for functional purposes, including the expression of their beliefs about topics such as L2 education and educational technology.

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APPENDICES

Appendix A: Recruitment Flyer



UNIVERSITY OF
SOUTH FLORIDA

Protocol # Pro00036725

Hello TESLA Students

About This Study

I would like to ask doctoral students who enrolled in the 2018 summer course titled *Applications of Technology to SLA and FL Education* to take part in a research study that is called *Doctoral Students' Perceptions of Educational Technology*. The person who is in charge of this research study is Patrick Mannion. This person is called the Principal Investigator.

I (Patrick Mannion) would like to know what you think about educational technology. In particular, I would like to ask what you think about the use of technology to teach and learn English and your experiences creating a digital story related to this topic. You have the right to not share your ideas and you can change your mind at any time for any reason. Other than collecting the data for this study, I will not intrude in your physical space or your private interests. You have the right to decide the extent, timing, and circumstances for sharing information about yourself. You can also choose how much information to share, or share nothing at all, if you so decide. You can change your mind about participation, or how much you would like to participate at any time and do not need to provide any reason at all.

In order to better understand what you think about learning with technology and classroom instruction methods, I would like to ask you to answer survey questions and meet me for an interview. I would also like to obtain copies of the digital stories you created and the online asynchronous discussion threads in which you participated during the course.

If you are interested in sharing your ideas and your digital stories and online asynchronous discussion thread posts, please read the attached informed consent form. If you have any questions, please let me know. I will gladly explain its contents to you. After reading the form, if you understand what the form says and would be willing to let us find out what you think about the activities in your class, please fill out and sign your name on the form.

Sincerely,

Patrick Mannion

Appendix B: Informed Consent Form

Study ID:Pro00036725 Date Approved: 10/30/2018



Informed Consent to Participate in Research Involving Minimal Risk

Pro # Pro00036725

You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below.

We are asking you to take part in a research study called:

Doctoral Students' Perceptions of Educational Technology

The person who is in charge of this research study is Patrick Mannion. This person is called the Principal Investigator. He is being guided in this research by Dr. John Liontas.

The research will be conducted at the College of Education at the University of South Florida.

Purpose of the study

This study will explore the perceptions and dispositions of doctoral students in the field of technology in education and/or second language acquisition, who participated in a 2018 summer course titled *Applications of Technology to SLA and FL Education*, regarding the use of educational technology for teaching and learning second or foreign (L2) languages. The purpose of this study is to investigate the online asynchronous discussion threads in which the doctoral students engaged and the digital stories which they created. I also would like to ask them to answer online survey questions and meet me for interviews. I hope that this research can improve understandings of the doctoral students' educational technology-related perceptions and dispositions because their future teaching and research are likely to impact and influence the path of future L2 teaching and learning.

Why are you being asked to take part?

We are asking you to take part in this research study because you are a doctoral student who was enrolled in the 2018 summer course titled *Applications of Technology to SLA and FL Education*. I believe this research might contribute to a better understanding of future directions in L2 teaching, learning, and research.

Study Procedures:

If you take part in this study, you will be asked to complete and or participate in the following:

Social Behavioral



10/17/2018

Page 1 of 4

1. Take an online survey. This should take approximately 15-30 minutes.
2. Have an interview with the researcher (Patrick Mannion) at a time and location of your convenience. This should take approximately 30-60 minutes.
3. Allow the researcher (Patrick Mannion) to audio or video record the interview. If you choose not to allow the researcher to audio or video record the interview, you may still take part in other parts of this study.
4. Allow the researcher (Patrick Mannion) to collect a copy of the digital story you created in this course. If you choose to allow me to collect a copy of your digital story, I will ask the instructor of the course for a copy.
5. Allow the researcher (Patrick Mannion) to collect copies of the online asynchronous discussion threads in which you participated during this course.

Your information will be kept confidential and only the Principal Investigator (Patrick Mannion) will have access to the copies of your digital stories, copies of your online asynchronous discussion threads, electronic survey, and recorded interviews. After you complete all the relevant participation, we will remove your name and any identifying personal information.

Total Number of Participants

Doctoral students who enrolled in the 2018 summer course titled *Applications of Technology to SLA and FL Education* are invited to participate in this study. About 16 participants will take part in this study at the College of Education at the University of South Florida.

Alternatives / Voluntary Participation / Withdrawal

You have the alternative to choose not to participate in this research study. You should only take part in this study if you want to volunteer; you are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study. Your decision to participate or not to participate will not affect your student status, course grade, recommendations, or access to future courses or training opportunities.

Benefits

You will receive no direct benefits from this study. However, you might benefit indirectly from the knowledge that is developed in this research since its focus is on educational technology in L2 education. This research is considered to be minimal risk.

Risks or Discomfort

This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

Compensation

We will not pay you for the time you volunteer while being in this study.

Costs

It will not cost you anything to take part in the study.

Privacy and Confidentiality

We will keep your study records private and confidential. Certain people may need to see your study records. Anyone who looks at your records must keep them confidential. These individuals include:

- The Principal Investigator (Patrick Mannion).
- Certain government and university people who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.
- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.

We will need to have your student ID number filled out in the survey, so we can associate your input with the corresponding student ID number. Thus, your data will be anonymous.

We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

If you have any questions, concerns or complaints about this study, or experience an unanticipated problem, email Principal Investigator, Patrick Mannion at mannonp@mail.usf.edu

If you have questions about your rights as a participant in this study, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638 or contact by email at RSCH-IRB@usf.edu.

Consent to Take Part in this Research Study

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

Signature of Person Taking Part in Study

Date

Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.

Signature of Person obtaining Informed Consent

Date

Printed Name of Person Obtaining Informed Consent

Appendix C: IRB Approval Letter

Patrick Mannion,
Teaching and Learning
5118 7th Avenue North

Saint Petersburg, FL 33710

RE: Expedited Approval for Initial Review

IRB#: Pro00036725

Title: Second Language Acquisition Doctoral Students' Perceptions of Educational Technology

Study Approval Period: 10/30/2018 to 10/30/2019

Dear Dr. Mannion:

On 10/30/2018, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents contained within, including those outlined below.

Approved Item(s):

Protocol Document(s):

[IRB version 1.docx](#)

Consent/Assent Document(s)*:

[Informed Consent Form \(version 3\) \(updated 10-17-2018\).docx.pdf](#)

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent documents are valid until the consent document is amended and approved.

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

- (5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).
- (6) Collection of data from voice, video, digital, or image recordings made for research purposes.
- (7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural

beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies. As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) business days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in blue ink, reading "Melissa Sloan". The signature is written in a cursive style with a large, sweeping loop over the "S" in "Sloan".

Melissa Sloan, PhD, Vice Chairperson USF Institutional Review Board

Appendix D: Digital Survey Questions

1. What is your name?
2. What country are you from?
3. In what year are you in the TESLA program? (Please explain if you choose "Other")
4. What is your first language? (Or, what are your first languages?)
5. What other languages can you speak? What are your proficiency levels with these languages? (e.g., beginner, intermediate, advanced, highly advanced/native)
6. How often do you use educational technology (e.g., collaboration tools such as Google Docs, language study apps or games, AR or VR) to study foreign/second languages?
7. What are some of the types of technologies you have used to study a foreign/second language? What is your impression of those technologies?
8. How often have you used educational technology to teach foreign/second languages?
9. What are some of the types of technologies you have employed to teach a second/foreign language? What was your impression of those technologies?
10. Is there anything in particular you would like to share regarding your perceptions of educational technology? (e.g., collaborative writing technology? language-learning apps? language-learning games? artificial intelligence? virtual reality? augmented reality?)
11. What was your understanding of educational technology before taking FLE 7700?
12. What are your perceptions of educational technology today?
13. Have your perceptions of educational technology changed since taking FLE 7700? If they have, how have they changed? Please be specific.
14. How do you imagine you may use educational technology in the future?

15. What new types of technology would you like to learn more about or employ in your future teaching?
 16. Please check any of the following educational technology or educational technology-related courses you have taken at the University of South Florida. If you have taken any other technology-related courses at USF that are not on this list, please list them under "Other".
 17. How was your experience making a digital story in your class?
 18. What were the challenges you encountered while making your digital story?
 19. What was easy about your digital storytelling project?
 20. What did you enjoy about making your digital story?
 21. What did you learn from your digital story experience?
 22. Did your perception of educational technology change as a result of your digital storytelling project? If yes, in what ways did it change?
 23. Would you be willing to engage in the holistic process of creating a digital story again?
Why or why not?
 24. Would you like to use digital storytelling with your current or future students? If yes, why would you like to use a digital storytelling project and how would you like to employ such a project?
- Likert-Scale Items** (agreement or disagreement; 1–5 points; (5) strongly agree – 1 (strongly disagree)
25. I learned a lot about educational technology in the course FLE 7700 Applications of Technology to SLA and FL Education.

26. The course Applications of Technology to SLA and FL Education (FLE 7700) was challenging.
27. I learned a lot from my classmates in the course FLE 7700 Applications of Technology to SLA and FL Education.
28. The digital storytelling project in FLE 7700 was enjoyable.
29. The digital storytelling project was difficult.
30. Educational technology can play a valuable role in learning a second or foreign language.
31. Educational technology can play a valuable role in teaching a second or foreign language.
32. I enjoy learning about new types of educational technology.
33. I think it is the duty of teachers and teacher educators to continue learning about educational technology over the course of their careers.

Appendix E: Semi-Structured Interview Questions

Interview Questions for *Second Language Acquisition Doctoral Students'*
Perceptions of Educational Technology

Pro # Pro00036725

Patrick Mannion

1. Demographic questions: Please tell me about yourself. Where are you from? What is your first language? What languages can you speak, read, or write? What's your level of proficiency with these languages?
2. Please tell me about your perceptions and knowledge of educational technology before you took this class?
3. Before this class, did you have any experience using educational technology as a student or teacher? If so, please me about them.
4. Before this class, did you have any experience making a digital story? If so, please tell me about it.
5. Before this class, did you have any experience creating or editing videos? If so, please tell me about it.
6. Did your perceptions of educational technology change as a result of taking this class? If so, how did they change?
7. What kind of educational technology did you learn about in this class? What do you think about it? Do you plan to use it in the future?
8. Please tell me about your experience making a digital story in this class.
9. What was your digital story about?
10. How did your experience creating a digital story, if at all, influence your opinions regarding the use of technology in second/foreign language education?
11. How do you think you may use educational technology in your teaching or language study in the future?

Appendix F: Sample of Entries in Dissertation Journal

Transcription Tool

For transcribing, I am primarily using a transcription app called “Express Scribe Transcription.” I like this transcription tool, which is basically just an audio file player, because when I pause the play button it moves back (rewinds?) about a second on the audio file. This helps me to avoid missing words that I otherwise might miss when I hit the pause or stop button. If I hit the stop button right when a word is being pronounced, I might miss what it is when I press the play button again. My iTunes audio player also rewinds too quickly making it hard to go back only a few seconds.

4-18-19

Today I worked on transcribing the interview with [Participant 4].

4-19-19

I continue transcribing [Participant 4]’s interview.

Challenges of Transcribing

This is something I have been thinking about during all the transcription processes. I try to transcribe the interviews faithfully, or in a way that reflects what was said. There are challenges, however. One is that the interviewees and I often start a sentence (if we can call them “sentences”) and then stop and start the sentence over with new words. Are these called “repairs”? I use commas for these since they are meant to be the same sentence. I think a period would indicate the thought was finished. Another challenge is having to decide whether or not a clause starting with a conjunction should be the start of a new sentence or not. I sometimes begin a new sentence, even following conjunctions such as “and” because I think the previous sentence had ended and the speaker is beginning a new one. In this case, the conjunction is focusing more as a ??? [discourse marker?].

40-20-19

I continued working on [Participant 4]’s interview. It’s very slow going. I realize the extremely slow pace of transcribing is familiarizing me with the interview data, but it’s frustrating to only finish a few minutes of transcription in over an hour of tiring work.

4-28-19

Today I added the survey data, in the form of an Excel spread sheet, to the MaxQDA file. Since the MaxQDA file no longer contains just discussion thread data, I re-named the file from “Discussion Threads” to “Dissertation.” MaxQDA seems well-equipped to upload and add survey data. It created codes from both the columns (or column headers), which were the questions in the survey, and the rows, which were the names of the participants. I am being careful to create many backup copies of the MaxQDA document.

With the new codes from the upload, the list of codes grew even longer. Therefore, I began sorting codes into groups to make their large number more manageable and easier to understand. After having done it for a while, I can see that grouping the codes together helps me see connections between the codes and data. It also helps me synthesize the large amount of data I have.

Appendix G: Visualization of Codes for Research Question 1

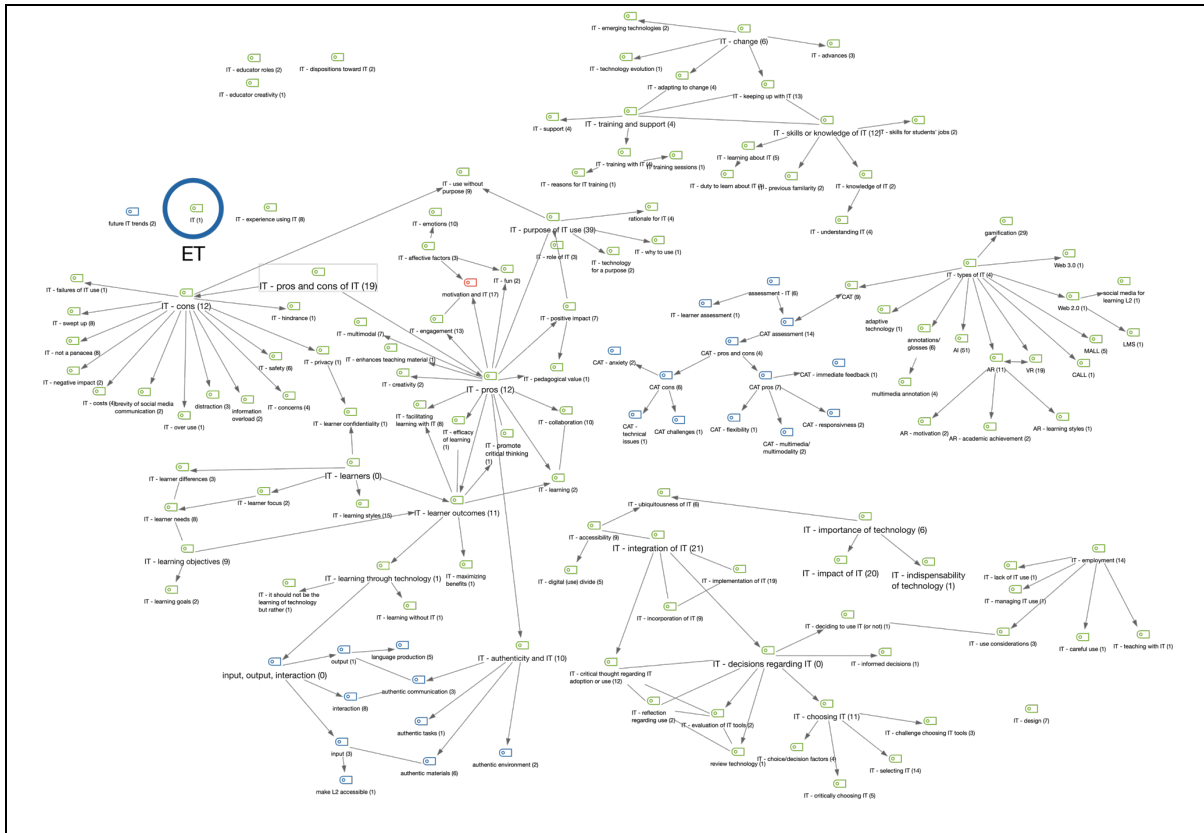


Figure 21A. Visualization of codes for Research Question 1. I employed the MAXMaps function in MaxQDA to create a visual representation of codes.

Appendix H: Discussion Thread Prompts

Week 3 – Discussion Blog

I read your postings and I am amazed at how much experience and insights you collectively have. I have no doubt that each and every one of you will benefit from each other reacting to your posts. Please do so consistently as I am grading your participation on this syllabus requirement. Grading considerations aside, all of you should welcome the opportunity to react to each other's posts as they allow you to engage in a true online discussion here.

This week's module deals with **Emerging Technologies & Cultural Considerations**. To that end, you are asked to read two articles, one by Liontas (2006) and one by Dunkel (1999).

If you are wondering about the gap in the publication dates (1999-2006), reading these two articles would hopefully make clear to you the need to at least think critically about the need for *Artificial Intelligence* on the one hand and *Computer-adaptive Tests* on the other hand even though today is the year 2018 (and there is roughly a decade between each of these texts). I will refrain from giving away the answer here but I will ask that you juxtapose your answer along with the **Cultural Considerations** one must also think about and include in the K-16 curriculum when engaging in such multimedia endeavors. The critical issue here remains: *What's the most prudent way in organizing all this knowledge steeped in diverse cultures? What are the arguments for or against such an approach? To what end should teachers be responsible for such knowledge integration? Should advances in AI be welcomed or curtailed in our FL and SL curricula? And finally, how does AI compete with Digital Storytelling? What story would you like to tell using today's digital technologies? How do the new 6 TESOL Principles and WIDA Standards fit into all this?*

Note: I sincerely hope that you will enjoy reading the PDF file, **Digital Storytelling**, as it includes a great many insights and suggestions for you all. I am also asking that you take a moment or two to critically reflect on what you have read thus far, put on your teacher's hat regardless of size and/or fit, and share with your classmates and me your thoughts, ideas, lessons, and the like you heretofore derived from this week's reading material. Following your own posting, I expect that you react to each other's comments in a constructive and helpful way for I am convinced that each and every one of you will cite different digital storytelling insights here, but collectively there shall be a plethora of information deemed most helpful to us all.

So squeeze your individual and collective knowledge and let's see our knowledge enacted for the common good!!!

Onwards we go! Have fun!

[Course instructor's initials]

Week 4 - Discussion Blog

As preannounced yesterday during class, I want you to take a close look at the PDF **Reimagining the Role of Technology in Education**. You should peruse the entire PDF here!!! Coupled with my own PDF **Emerging Technologies and Language Skills Integration** presented yesterday to you all (see enclosed PDF) and this week's three (3) articles to read,

1. Read: Liantas, J. I. (2018b). Understanding idiomaticity in CALL. In J. Perren, K. Kelch, J-s Byun, S. Cervantes, & S. Safavi (Eds.), *Applications of CALL theory in ESL and EFL environments* (pp. 36-58). Hershey, PA: IGI Global Publishing.

1. Read: Liantas, J. I. (2018c, forthcoming July 2018). Refocusing the digital lens of idiomaticity: A second look at understanding idiomaticity in CALL. *Iranian Journal of Language Teaching Research*, 6(2).

1. Read: Kramsch, C. (2000). *Authenticity and authorship in the computer-mediated acquisition of L2 literacy.*

I would like for you to choose **one** of the five (5) sections presented in the PDF **Reimagining the Role of Technology in Education** (pp. 9-85) and juxtapose that content against that presented in this week's three articles to read. Specifically, what are the pressing arguments being offered here? Where do you see the similarities/dissimilarities? In what specific ways do all these "readings" help us reimagine and spearhead the impact of (language) technology forward for the achievement of all learners?

As always, I expect you to respond to each other and be "polite" in the process J

Have fun!

[Course instructor's initials]

For **Week 5**, the theme is **Application of CALL and Digital Environments**. To this end, I ask that you first read Oxford, R. L. (2003). *Language learning styles and strategies: An overview*. Following your perusal of Oxford's article, you should then read the Liantas, J. I. (2016). *Let the games begin! Harnessing the power of gaming in second language education*.

Thereafter, read the enclosed pdfs found in Week 5 Module. I ask that you give the following prompt your thoughtful consideration as you have done up to now.

No one disputes that knowledge of "learning styles and strategies" are important constructs in the teaching and learning of foreign and second languages. Similarly, no one disputes the power of "gaming" in today's language learning. However, when these two theoretical and pedagogical realms are brought together to produce a cohesive whole (or a digital platform for learning) wherein the "whole is greater than the sum of its parts," many may still argue

that gaming in second and foreign languages is indeed a “waste of valuable classroom time” when the time should be applied to “other’ more important learning pursuits such as learning important grammatical constructs or academic STEAM content.

In your professional estimation, in what ways does the application of CALL and digital environments justifies such an investment both in terms of harnessing the power of gaming in language education and in terms of designing, developing, and applying “digital games” in the classroom and beyond. What specific connections do you see between “learning styles and strategies” and the “power of gaming in language learning”? What three (3) arguments would you make either in favor of or against the application of “gaming” in the classroom and beyond? And finally, what do you consider to be some of the most gratifying digital experiences you personally hold to be both efficient and effective (this may include VR/AR platforms as well)?

As always, have fun with your reflection, put on your thinking cap, and let’s see where this discussion blog will take us this week, shall we?

Make me proud! Onwards we go!

[course instructor’s initials]

Appendix I: IRB Certificate



Appendix J: Digital Survey Results for Likert-Scale Items (Items #25–33)

Table 17A

Digital Survey Results for Likert-Scale Items (Items #25–33)

Participant	(25) I learned a lot about educational technology in the course.	(26) The course was challenging.	(27) I learned a lot from my classmates in the course ...	(28) The digital storytelling project was enjoyable.	(29) The digital storytelling project was difficult.	(30) Educational technology can play a valuable role in learning a second or foreign language.	(31) Educational technology can play a valuable role in teaching a second or foreign language.	(32) I enjoy learning about new types of educational technology.	(33) I think it is the duty of teachers and teacher educators to continue learning about educational technology over the course of their careers
1	3	3	4	4	3	4	4	4	4
2	5	3	5	5	3	5	5	5	5
4	5	5	5	5	1	5	5	5	5
5	5	5	4	5	4	4	4	5	5
6	5	4	5	5	4	5	5	5	3
7	4	4	4	5	2	5	5	5	5
8	4	4	3	5	5	5	5	5	5
9	4	5	2	5	2	5	5	5	5
10	4	4	4	5	3	5	5	5	5
13	3	1	3	5	1	5	5	5	5
14	5	2	4	5	1	5	5	5	5
15	5	4	5	5	4	5	5	5	5
16	5	4	5	4	3	5	5	5	5
17	3	3	4	4	2	4	4	5	5

ABOUT THE AUTHOR

Patrick Mannion was born in Pennsylvania and grew up in the Ohio. He earned a Bachelor of Arts degree (History major, East Asian Studies minor) from Miami University (summa cum laude), a Master of Arts Degree (Japanese language and literature) from Ohio State University, and a Master of Education (foreign language education) from the University of South Florida. At Ohio State University he worked as teaching assistant in undergraduate-level courses on East Asian culture, Japanese culture, and Japanese literature. He also taught English as a foreign language in Japan for about two decades before returning to the US to pursue graduate studies in the field of education.

During his time as a doctoral student and candidate in the Second Language Acquisition / Instructional Technology (SLA/IT) program at the University of South Florida, he presented papers at international, national, state, and local conferences. He also participated in research projects at the University of South of South Florida and public and private middle schools in the Boston, MA area that were directed by faculty or staff from Boston College and the Massachusetts Institute of Technology. His academic interests include pedagogical applications of Systemic Functional Linguistics, multimodal literacy, and foreign language education.