Pre-service and in-service ESL teachers' beliefs about the
use of digital technology in the classroom

by

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Abstract

It has long been accepted that teachers' beliefs guide their classroom practices (Pajares, 1992; Fang, 1996; Woods, 1996; Borg, 2006). Yet, little is known about what teachers believe about digital technology integration, despite the attempts by mainstream education to incorporate it into language teaching, especially in the field of second language education. Using Borg's (2006) framework of language teacher cognition, this study investigated the beliefs of pre-service and in-service ESL teachers about the use of digital technology in the classroom, and the factors that influence those beliefs. Thirty-five Canadian pre-service and in-service ESL teachers completed an online survey and some were interviewed ($n=10$). The findings suggest that the participants generally hold positive attitudes about using digital technology in the second language classroom. These beliefs seem to be influenced by the participants' classroom practice, experiences with digital technology, technology-related training, context(s) in which such digital technology was used, and age.

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1 Introduction

Society in the 21st century has brought with it the advancement of technology in a wide range of social and economic aspects. Today's learners, in particular, have experienced the technological developments from an early age, and as a result, have become active and competent digital technology users. Prensky (2001) coined the term, "digital natives" referring to this new generation of learners. He argued that "today's students think and process information fundamentally differently" (p.1) from previous generations and as such, their learning patterns are different. He further proposed that, in order to educate such learners, teachers need to create new ways of teaching, which include incorporating technological and digital aspects of instruction into the traditional curriculum in accordance with the needs and expectations of today's learners. Back in 2004, Warschauer (2004) predicted an increased use of advanced, personalized, mobile, and affordable technology (i.e. information and communication technology in particular) in education, the effects of which we are witnessing today in many educational institutions. Abundant technological equipment and resources are being made available to learners and teachers regardless of their disciplines and institutional levels. In college lectures, professors and instructors use digital projectors and presentation applications instead of the traditional blackboard and chalk. Even educational policymakers have emphasized the need to implement digital technology in everyday K-12 classrooms. Yet, teachers in general education have been observed to vary in their use of digital technology. Some teachers use it for administrative tasks alone, while others incorporate it in their teaching on a regular basis. Even so, there are teachers who do not use digital technology in the classroom at all. What is the reason for such diversity? Why do some

teachers use digital technology and others do not? What are the underlying beliefs behind such practices? Why do teachers hold such beliefs? In an effort to answer these questions, the present study examined what teachers of English as a second language (ESL) believe about the use of digital technology in the classroom and identified possible factors that influence such beliefs.

1.1. Statement of the problem

Mainstream educational policymakers and institutions started to foster the implementation of technology into classroom instruction hoping to capitalize on the promise of better student achievement to become a competitive member of today's technology-driven society (Jenson, Taylor, & Fisher, 2011). The use of technology in the classroom instruction has been deemed to be effective way to create cooperative, interactive, and motivating learning environments where students achieve more academically and are engaged more in classroom activities (Muir-Herzig, 2004). Similarly, the computer-assisted language learning (CALL) field has focused on investigating the impact of technology on learning (Hubbard, 2008; DuBravac, 2013). Researchers investigated a variety of computer equipment and applications to determine their benefits for the development of second and foreign language acquisition. Technology provides not only authentic learning environment where learners experience realistic linguistic materials and interact with native speakers, but also personalized learning opportunities for learners of different levels to take control of their language development (Tomlinson, 2012).

Yet, in this relatively sudden advance of technological innovation in education, many researchers have reported that actual teachers' use of technology has not yet

reached the levels of implementation expected by the policymakers (Milton, 2003).

Rother (2005) reported that more than 80 percent of high school teachers use technology only for administrative purposes rather than in instruction. Young (2010) also found similar results among the teachers of tertiary levels. Efforts have been made to find answers for such a discord between the intended teaching practice and actual practice of teachers within the fields of teacher cognition and of innovation. As such, researchers in the field of computer-assisted language learning (CALL) also came to an agreement that policymakers should consider what teachers really feel about the use of technology and find out what they need prior to enforcing implementation of technology (Bax, 2003; Gee, 2003; DuBravac, 2013).

Psychologists were perhaps the first to investigate human behaviours to uncover the driving force behind their decisions (Rokeach, 1968; Nisbett & Ross, 1980). Rokeach (1968) inferred this underlying force to the beliefs system, which he defined as representations of human life (e.g. politics, cultures, religions, and economics) that are said to influence the ways people behave, think, and feel. In the field of educational research, the beliefs systems of teachers have been studied extensively, confirming the link between teachers' beliefs systems and their behaviours in the classroom (Clark & Paterson, 1986; Kagan, 1990; Pajares, 1992; Fang, 1996). Similarly, researchers in language education also identified teachers' underlying thoughts and feelings as a key determiner of their instructional decisions (Johnson, 1994; Woods, 1996; Borg, 2006).

On the other hand, inquiries investigating teachers' underlying beliefs have also been sought in relation to the theory of diffusion-of-innovation (Fullan, 1982; Rogers, 1995), which provides frameworks to understand how educational innovation is diffused

in actual classroom practice. This research has identified teachers as key agents in educational innovation. Markee (1993) defined innovation “as proposals for qualitative change in pedagogical materials, approaches, and values that are perceived as new by individuals who comprise a formal (language) education system” (p. 231), and emphasized that language teachers are the most important elements in the process of educational innovation.

Similarly, in the field of CALL, Bax (2003) suggests that, when all individuals involved (i.e. language teachers) continually implement innovation (i.e. use of technology), the innovation becomes fully diffused and “normalized” (p. 25) in regular language classrooms. He also emphasized that teachers’ positive beliefs about technology in learning are the fundamental premise for successful integration of technology in language instruction. In other words, teachers must be the principle agents who adopt new technology and try it several times, while overcoming the fears and skepticism that they and others may harbour, thus gradually ensuring that the innovation becomes normalized practice in teaching.

Teacher beliefs about technology integration and factors that influence these beliefs have been studied in various contexts and countries (Feng, 2012). Yet, with an exception of one study done in the context of English as a foreign language (EFL) (Nishino, 2012), little effort has been made to understand what language teachers believe about the use of digital technology in language learning and teaching in Canada. Such inquiry is important for two reasons. First, Canada is one of the countries with large population of English language learners and ESL education is an integral part of the Canadian education system (People for Education, 2008). Secondly, the implementation

of technology has been promoted nationwide by Canadian educational policymakers and institutions. For example, the province of Ontario reported that more than 40 public and secondary school boards in the province have already implemented technology or planned to implement it in the near future (Shields, Telfer, & Bernard, 2012), but there are few reports on how the teachers feel about such implementation. In fact, in Canada, to date, only two studies have investigated the perceptions of public school teachers (Wozney, Venkatesh, & Abrami, 2006) and high school ESL and French language teachers (Parks, Huot, Hamers, & Lemonnier, 2003) about the use of computer technology in the classrooms and these were done in the province of Quebec. However, both of the studies did not focus on language teachers and ESL teachers specifically. Therefore, this presents an important and empirical void that needs to be filled, particularly with ESL teachers in the Canadian context.

The aim of this study is to investigate ESL teachers' beliefs about the use of digital technology in the classroom and to identify the sources of those beliefs. Both pre-service and in-service ESL teachers in the province of Ontario were invited to participate in this study. A total of 35 ESL teachers completed an online questionnaire and 10 of them participated in the post-survey interview. The findings suggest that both pre-service and in-service participants showed positive attitudes toward the use of digital technology in the classroom. Yet, those beliefs were influenced by different factors.

The remaining chapters are organized as follows to detail this study in terms of theoretical and empirical background, research design, results as well as a discussion of the findings, implications, and limitations of the study.

Chapter 2 reviews a body of the literature needed to provide a background for the

current inquiry. First, CALL is described to inform what CALL is, the types of foci it investigates, and the factors that have been identified as influential in the language teachers' actual use of digital technology. Next, research on teacher beliefs in the field of general education is discussed, followed by the explanation of the theoretical framework used in this study. Lastly, empirical research that investigated language teacher beliefs in relation to the use of digital technology is reviewed.

Chapter 3 describes the mixed-method research design employed and details, the participants recruited, data collection tools used (i.e. online questionnaire, semi-structure interviews), and the types of data analysis employed.

The results of the analyzed data are reported in Chapter 4. Teacher beliefs about the use of digital technology are presented first, followed by the factors that influence those beliefs.

Chapter 5 discusses the results along with the theoretical and pedagogical implications of this study. This chapter ends with a discussion of the limitations of the study and suggestions for future research.

2 Literature Review

In this chapter, the body of theoretical and empirical literature in the fields of CALL and language teacher cognition will be reviewed respectively. CALL will be discussed in terms of the use of technology in general and specifically in language education (i.e. technology, technology-enhanced tasks, learners, teacher education); the background factors that affect such uses will be detailed next. Then, a body of research on teacher beliefs drawn from general education will be reviewed, followed by a description of Borg's (2006) framework of language teacher cognition used in this study. After that, research on teacher beliefs in relation to their implementation of digital technology in the classroom will be discussed. This chapter concludes with the questions that guided this inquiry.

2.1. Computer-assisted language learning (CALL)

The rapid advancement of technology has insured not only its permeation into the great swaths of modern society, but also its place as an integral part thereof. Educational policymakers and institutions have commissioned resources, funds, and research to ensure implementation of technology in the classroom. The field of language education, in particular, has received great attention. Indeed, the interest in the application of technology within this field has become a research area in its own right, focusing itself on the use of computer technology in language learning. This field, dubbed computer-assisted language learning (CALL), studies the effective integration of computer technology in language teaching and learning with an emphasis on the technology's capacity that provides authentic and interactive learning environments where learners can

take central roles in learning (DuBravac, 2013). The earliest use of technology in language learning can be traced back to the 1960s when the language lab was the only form of computer technology used in the language classroom, and even then only by a small population of language teachers (DuBravac, 2013). Since the 2000s, however, the availability and affordability of personal computers and the Internet have been the catalyst for the wide implementation of technology in language learning, which has led to the increased interest in CALL (Warschauer, 2000; 2004; Gee, 2003; Hubbard, 2008; Garret, 2009).

Definitions of CALL have been formulated in a number of writings. Most recently, DuBravac (2013) in his book about technology use in second language curriculums introduced various terms (e.g. CALL, TELL, CMC) in relation to the technology used in language education. The most general term, CALL, is said to refer to “the use of any type of computer hardware, and software that helps learners to develop their language skills” (p. 2). Another related term, TELL, (technology-enhanced language learning) has been coined to include any electronic equipment that is not seen as being directly related to computers (e.g. projectors, phones, cameras, audio- and video-recorders) (Bush & Terry, 1997). Finally, CMC refers to computer-mediated communication, specifically concerning communicative applications using computer technology. This type of technology, with the development of online computing environments (i.e. Internet) has become the main interest among CALL researchers, and as a result, so have the various internet-based applications (e.g. email, Skype, Google, instant messaging, Social networks).

In light of DuBravac’s (2013) categorization of terms, in this study, *digital*

technology is operationalized as the various types of electronic equipment (e.g. desktop and laptop computers, printers, scanners, mobile devices such as cell phones and tablets, interactive whiteboard, digital projector, digital camera), general (e.g. word processing and presentation) and educational applications (e.g. WebCT, blackboard, online learning solutions, and language learning programs), as well as the Internet and Internet-based applications (e.g. email, instant messaging, Google, Skype).

Research in the field of CALL has diligently investigated the use of technology in language classrooms in terms of four main foci: technology, tasks with technology, learners, and teacher education (Hubbard, 2013). Technology, the first focus, has produced studies that identified and evaluated available technologies in order to find out how it can be used effectively for language teaching and learning (Fotos & Browne, 2004). Levy (2012) summarized the various types of technology and their effectiveness for teaching the four language skills (i.e. reading, writing, speaking and listening). In terms of reading, for instance, technology such as the Internet can provide ample and authentic reading materials. In spite of concerns that such use of technology requires students' voluntary and active participation, Toland's (2010) study shows that with teachers' presence, such technology could be made effective in developing reading skills. Her study compared students' reading performance in a high-tech and low-tech school where teachers actually used technology in teaching reading, and found that students in the high-tech school performed better than the ones in the low-tech school. As with reading materials, various audio- and video- sources on the Internet provide great amounts of listening and speaking opportunities. Authentic and natural sounds and intonations provide more opportunities to listen and to practice pronunciation as well.

Actually, Gromik (2012) observed that the number of words students spoke increased after using video-recording applications on their cell phones as a part of classroom projects. Furthermore, Levy (2012) noted that various applications such as word processing can be beneficial for enhancing learners' writing skills by adding special functions such as spelling, grammar check, and online dictionaries. Interestingly, students can benefit in acquiring vocabulary by using technology while participating in various tasks to enhance language skills (Levy, 2012). In fact, Warschauer (2009), though not entirely concentrated on ESL learners, found that the use of individual laptops in the classroom supported the students' writing performance in American elementary schools. Similarly, Hur and Suh (2012) in their study of ESL students' language learning achievement found that students seemed to acquire vocabulary more effectively when taking part in a learning task that used an interactive whiteboard in the classroom. Hence, technology seems to aid language learning and teaching.

The growing interest in the communicative purposes of technology use, leads researchers to shift their focus of investigation toward language learning tasks that integrate technology to provide more opportunities for learners to interact and communicate in target languages. Specifically, researchers investigated how technology can be integrated to promote learners' communicative competency by providing them with opportunities to interact with authentic audio- and video-materials and with native speakers of target languages, encouraging students involvement (Paterson, 2010; Tomlinson, 2012; DuBravac, 2013). Paterson (2010), for example, examined the use of games and simulations from the perspectives of psycholinguistic and sociocultural theories in the field of Second Language Acquisition (SLA) and concluded that the use of

technology benefits language learning by promoting learner-centered interactions between peers and between learners and teachers, providing a fertile environment for student engagement and authentic linguistic input. Tomlinson (2012) also pointed out that the use of technology provides opportunities for students to review language-learning experiences at any time, in any place, with the help of easily accessible resources on the Internet and convenient communication with teacher and peers. This, in turn, encourages students to control their own learning experience and to learn autonomously based on their individual interests and needs (Garret, 2009; Tomlinson, 2012; Reinders, 2012). DuBravac (2013) emphasized that technology is useful in communicative language teaching because it promotes opportunities for learners to communicate. Apart from these benefits in a learner development, Bruess (2003) suggested that technology provides more convenience for teachers in managing classrooms, teaching materials, and instructing students. In sum, the use of technology in language tasks brings about numerous developmental benefits.

The third focus, learners, has appeared as a result of the realization that learners also need to be trained in how to use technology to learn languages because they are just as important an agent as the teachers. As noted by many scholars, the use of technology has brought about a change in the role of teachers in the classroom (Warschauer & Healy, 1998; Bax, 2003). In using technology-integrated tasks, teachers must become facilitators while their students become active agents of using technology. As such, learners are not just recipients of their teachers' instruction, but are active contributors in their own learning. Hubbard (2013) explained, in his review of several studies on learner training that even though today's future teachers have grown up using technology, they still need

to be made aware of the fact that technology can be used for teaching and trained in how to use it effectively in their own teaching. In fact, Hubbard (2013) recommends that training teacher trainees in the use of technology not only supports their own learning experience but also improves their effectiveness as teachers.

The last focus is that of teacher education in CALL, which is the focal point of this study. As the need for the implementation of technology in language classroom has been acknowledged more widely as a necessity for the future of education, the demand for teachers with skills and knowledge about how to use technology in language learning has increased. As such, many general and language teacher education programs have incorporated technology in their curricula in order to equip future teachers with the skills necessary to use technology in their future practice (Hubbard, 2008).

However, there are concerns about the effectiveness of such teacher training in the use of technology in the classroom. In fact, there are some contrasting findings among research in CALL. Some researchers found that teacher trainees who received technology-focused training are likely to show more willingness to actually use it in their future teaching practice (Van Olphen, 2007; Ebsworth, Kim, & Klein, 2010). For example, Van Olphen (2007) found that teacher trainees who completed technology-focused training courses reported having become familiar with it, and as a result, were more willing to use it later in their actual teaching practice. On the other hand, Kim (2008) found that teacher trainees did not seem to be willing to integrate technology even though they were trained in a technology-focused course. Additional research has found that teacher education does not sufficiently prepare in-service teachers before they start their teaching careers (Hubbard, 2008). For example, in a study of foreign language teachers at

universities in the U.S.A., Arnold (2007) found that the teachers used technology only to search information and distribute course materials as an alternative tool for their convenience. He concluded that teachers had different conceptions about the integration of technology, and that, in order for teachers to fully incorporate technology, they should be trained how to do so. Also, Kessler (2006) in a study of in-service teachers ($n = 240$) who completed English teacher training, found that those teachers who received training in how to implement technology in language classes (only half of the teachers received the training) did not see the training as useful because they were unsure how to apply the training to their teaching practice.

In light of such contrasting findings, researchers have shifted their focus onto uncovering the underlying factors behind teachers' decisions of whether or not to use technology in their teaching. Hubbard (2008), for example, has suggested seven possible reasons for teachers' different uses of technology: previous learning experience, lack of exposure to technology in teacher education, lack of time for technology-focused training, lack of technological infrastructure, lack of technology-related policy, lack of established methodology, and lack of experienced and knowledgeable educators. Most of the factors seem to be related to teacher education, indicating teacher training as an important factor in influencing teachers' decisions in terms of technology integration in language classrooms. Ertmer (1999) went on to claim that there are two types of barriers in teachers' use of technology: extrinsic and intrinsic. Extrinsic barriers include contextual and cultural factors that surround teacher practices, whereas intrinsic barriers refer more to teachers themselves, including elements such as their personal and pedagogical beliefs about the use of technology. These factors have also been studied in other research and

will be discussed in more detail within the following categories for this study: experience, training, context, and beliefs.

Experience includes teachers' experience with technology in their own learning and personal lives. Brown and Warschauer (2006), for example, found that the more pre-service teachers are exposed to the use of technology and have opportunities to actually use it, the more likely they are to incorporate technology in their teaching practice. In fact, Li and Ni (2011) reported that English as a Foreign language (EFL) teachers in Chinese primary schools merely used technology as a replacement of the previously used blackboards and audio equipment to plan and present lessons. This was because the teachers themselves did not have access to technology during their own schooling. This is in line with another study conducted with primary and secondary teachers in Quebec, Canada (Wozney et al., 2006), which found a strong link between teachers' previous computer technology use and their in-class practices.

The second factor that influences teachers' use of technology in the classroom is formal training in terms of technology use. This type of training needs to be provided as part of pre-service teacher education programs or within in-service professional development programs. This is because teachers' technological and pedagogical knowledge is an important factor that affects their use of technology (Chai, Koh, Tsai, & Tan, 2011; An & Reigeluth, 2011; Prestridge, 2012; Wozney et al., 2006). In fact, teachers acquire and develop necessary expertise for implementing technology in their teaching practice through direct and indirect training experiences before and during their teaching careers. Garret (2009), in her review of current trends and issues in CALL, suggested that teacher training with an emphasis on the use of technology within sound

understanding of SLA pedagogy and context would be a “major factor “ in the future development of CALL (p. 733).

The technology-related training offered in pre-service teacher education programs seems to have both positive (Fook, Sidhu, Kamar, & Aziz, 2011; Besinger, 2011; Feng, 2012) and negative (Woolard, 2012; Hayes & Ohrnberger, 2013) influences on teachers’ actual use of technology in their teaching practice. Fook et al.’s (2011) study showed that the pre-service EFL teachers in Malaysia showed more positive attitudes toward technology after completing technology-related training courses. Similarly, Besinger (2011) reported that pre-service teachers with positive attitudes about the use of digital games in their future teaching, cited a higher willingness to use digital games if opportunities were provided. Feng (2012) examined teacher- and student-related factors that influence teachers’ use of technology in ESL classrooms. It found that the more teachers are exposed to technology before their teaching careers begin, the more they feel comfortable in its use. This, in turn leads to their actual use of technology classroom.

On the other hand, those pre-service teachers in Hayes and Ohrnberger’s (2013) research did not choose to use digital games in their teaching because they had not used them in their own learning experiences, but rather only for their own entertainment. In this case, their previous experiences with digital games did not support the participants’ use of technology in teaching. Similarly, Woolard (2012) found that elementary school teachers decide to use digital technology based on their pedagogical beliefs rather than on their personal use of technology or previous experiences with it.

As for the in-service teacher training, An and Reigeluth (2011), in the study of the K-12 teachers’ perceptions about technology-enhanced classrooms, found that teachers

expressed the need to receive technology-focused trainings to ensure a more effective integration of digital technology. Wozney et al. (2006) also found that technology-related training experience is one of the influential factors in a teacher's active use of computer technology.

The contexts of classroom practices are another factor commonly found in CALL research. A number of studies found that context inevitably serves as both a constraint and a support in the use of technology in the classroom. Parks et al. (2003) emphasized that context should be an integral component for the successful integration of technology as it affords a positive learning and teaching experience with technology. Similarly, Kessler and Plakans (2008) found that teachers with higher levels of contextual knowledge (defined as “understanding the dynamics and relationships within the classroom and the rules and behaviours specific to a particular setting”; Richards, 2012, p. 49) seem to incorporate technology more often and actively than teachers with higher levels of technological knowledge. Other research has identified contextual factors that prevent a teacher's integration of technology in the classroom. Such factors are insufficient technological support and a lack of institutional support, time, and training opportunities (Shin & Son, 2007; An & Reigeluth, 2011; Feng, 2012).

Institutional support, in particular, seems to be the most influential constraint among the contextual factors. For example, Muir-Herzig (2004) argues that institutional supports such as technological infrastructures and increased opportunities for teachers' experimental use of technology, are necessary as they enable teachers to actually experiment with what they learn in technology-related training. Similarly, Bauer and Kenton (2008) found that teachers could not incorporate technology into their instruction

as often as they intended to because the institutional attitude toward the use of technology was not supportive.

On the other hand, even by providing increased support for contextual factors such as adequate resources and supportive institutions, if teachers do not appreciate the benefits of technology, they are more likely to refuse to incorporate it in their instruction (Yunus, 2007). More recently, Cuttrim-Schmid and Whyte's (2012) study revealed that, in spite of positive social, institutional, and instructional conditions for the use of interactive whiteboards (IWB), EFL (France and Germany) teachers did not use them, undermining their students' interactive and collaborative learning experience. In other words, some teachers only used IWB based on their own pedagogical stance of traditional teacher-centered instruction even though the intended purpose of IWB is to promote student-centred instruction. Li and Ni (2011) also found resistance and reluctant attitudes among Chinese EFL teachers toward implementation of technology and this is in spite of sufficient support from the policymakers in China. The negative attitudes stemmed from the preferred teacher-centered language teaching style over student-centered language teaching, which is encouraged by the use of technology.

These examples have led researchers to consider the final factor, the beliefs of language teachers. Teacher beliefs can explain the reasons why teachers do not use technology when all of the other three factors (experience, training, and context) provide favourable and positive conditions for its use. In fact, Inan and Lowther (2010) found that teacher-level factors (readiness and positive beliefs) figure more strongly in the use of technology than other school-related factors (e.g. institutional policy, technological infrastructure, opportunities for professional development). This is why many CALL

researchers (Gee, 2003; Bax, 2003; Ertmer, 2005; Garret, 2009) came to an agreement that beliefs seem to be an overarching factor that directly connects what teachers think with what they do in the classroom. Before detailing the investigations of teacher beliefs within the field of CALL, it is necessary to describe previous research on the topic undertaken in the field of teacher cognition.

2.2. Teacher beliefs

Rokeach (1968) defined beliefs as representations of human life (e.g. politics, cultures, religions, and economics); beliefs are said to influence the ways people behave, think, and feel. Furthermore, many psychologists argue that beliefs need to be understood as an instrument to reconstruct knowledge and information in human behaviours (Nisbett & Ross, 1980; Bandura, 1986). Similarly, Clark and Peterson (1986) suggested that, during the process of teachers' instructional decision-making, teachers' explicit knowledge about teaching is filtered by their underlying theories and beliefs. In other words, teachers decide whether to act on certain knowledge about teaching or not based on their own personal and pedagogical beliefs. Therefore, the research on teacher beliefs has been done under the assumption that teachers' classroom practices affect their "beliefs about their roles, their students, the subject matter areas they teach, and the schools they work in" (Nespor, 1987, p. 317). Investigations into teacher beliefs have increased in the field of teacher education in response to the need to understand teachers' behaviours for the purpose of improving student achievement (Clark & Peterson, 1986). Researchers have claimed that the relationship between these two aspects is unidirectional in that only, teachers' actions affect students' learning. However, research in cognitive psychology has influenced researchers in general education, provoking a

shift in the focus towards understanding teachers' behaviours in the classroom by examining their thinking, planning, and decision-making processes (Fang, 1996).

Similarly, over the past 30 years, the field of language education has investigated the beliefs that language teachers hold about language learning and teaching. The early research focused more on the role of teachers in language learning and found that teachers' beliefs influence their instructional decision-making and planning (Breen, 1991; Johnson, 1994; Woods, 1996). This early research also raised awareness of the importance to study not only what and how teachers teach but also what they think and believe about teaching in order to truly understand what happens in the language classroom. Breen (1991), in his experiment with approximately 100 experienced ESL/EFL teachers, concluded that the teachers' actions in the classroom constantly interact with their implicit theories (i.e. beliefs) derived from the teachers' experiences and knowledge about teaching. Also, Woods (1996) proposed that the teachers' networks of beliefs, assumptions, and knowledge (BAK) could explain teachers' behaviours and decision-making and that these BAK networks could continually evolve as teachers acquire more teaching experience and expertise.

These early efforts have recently become specialized to investigate particular curricula topics such as grammar (Borg, 1999; Phipps & Borg, 2007), writing instruction (Tsui, 1996), reading instruction (Johnson, 1992; Fang, 1995), error correction (Schulz, 1996; 2001), and communicative language teaching (Nishino, 2012). This type of research found overall that, although teachers seemed to have varied pedagogical beliefs in terms of particular curricula topics, language teachers' beliefs are clearly linked with their teaching practices.

Research conducted on teacher beliefs has been challenged on a number of grounds. The three main areas are: (1) various definitions of teacher beliefs, (2) different research instruments used, and (3) differences in populations of research participants.

In terms of defining teacher beliefs, they have been called teacher perspectives (Tabachnick & Zeichner, 1984; Goodman, 1988) and teaching ideology (Sharp & Green, 1975). Other researchers looked at teacher beliefs as teachers' personal and practical knowledge (Connelly & Clandinin, 1988), as well as their case knowledge (Calderhead, 1991). Pajares (1992) in his review of research on teacher cognition referred to the domain of teacher beliefs research as "a messy construct" (p. 307) concluding that it is difficult to conceptualize, understand, and define beliefs. He further argued that, however named, teachers' "educational beliefs" (p. 314) should be of interest to researchers because teachers, as human beings, inevitably construct beliefs through a condensing of all aspects of their lives.

Two of the most prominent research methods employed in researching teacher beliefs research have been self-reported instruments (i.e. questionnaires, scenario rating, tests) and verbal commentaries (e.g. structured, semi-structured, unstructured interviews) (Pajares, 1992; Fang, 1996; Borg, 2006). Each method elicits distinctive data about teacher belief. The former (i.e. self-reported instruments) enables researchers to investigate beliefs from structured and broader perspectives to determine a general tendency among a large population of teachers, whereas the latter (i.e. verbal commentaries) allows researchers to gather rich and in-depth responses about what teachers feel. However, this said, there have been a few concerns as well over the use of these two methods because some researchers found that what teachers report to believe is

not always aligned with what they actually do in the classroom (Pajares, 1992; Fang, 1996).

Teacher beliefs research has also investigated very diverse populations of teachers in terms of training (pre-service vs. in-service teachers), teaching experience (novice vs. experienced/veteran teachers), teaching expertise (non-specialist /expert vs. specialist/expert teachers), and learners (adult vs. K-12). When it comes to language teachers, the population is varied in terms of the language taught (English, Spanish, and Japanese) and the instructional context(s) (second or foreign language). Research generally shows that different groups of teachers tend to have different beliefs. Borg (2006) defined pre-service teachers as “those engaged in initial teacher education programs (at undergraduate or postgraduate level)” (p. 51) typically with little or no language teaching experience. In-service teachers, on the other hand, are referred to as the “qualified teachers” (p. 51) who completed the pre-service training. Many researchers found that because of this difference in teaching experience, pre-service and in-service teachers inevitably display different cognitive processes in teaching and the everyday activities of the classroom (Pajares, 1992). This is why this study looked specifically at pre-service and in-service teachers teaching English in a second language context.

In spite of these challenges, scholars agree that teacher beliefs guide their behaviour in the classroom. However, it is necessary then, to uncover the underlying factors that influence and shape teacher beliefs about themselves and teaching. These factors are gaining interest in the field of teacher beliefs research. Borg’s (2006) framework of language teacher cognition provides support in explaining the underlying factors that determine teachers’ beliefs, especially for the present study due to several

reasons. First, the framework is the most up-to-date review of empirical research done on beliefs that both general and language teachers hold. Particularly, the framework concerns language teachers in various contexts (i.e., foreign language or second language learning / teaching contexts) and with different levels of training (i.e., pre-service, in-service) and experience (i.e., novice, experienced, expert). In addition, there is little research to date that has applied Borg's framework to investigate language teacher beliefs. Instead, researchers in the field of general and language teacher cognition often chose to adapt existing frameworks in the field of educational technology such as Technology Acceptance Model (TAM; Davis, Bagozzi, & Warshaw, 1989; Yunus, 2007) and Technological Pedagogical Content Knowledge model (TPACK: Angeli & Valanides, 2005; Chai et al., 2011). Technology Acceptance Model (TAM) focuses on the teachers' beliefs about usefulness and ease of use of technology in integrating technology in the classroom and the factors that influence those beliefs. Such factors only address the external reasons such as technical support and training opportunities. Also, Technological Pedagogical Content Knowledge Model (TPACK) only looks at general teachers' expertise and its influence on their classroom integration of information and communication technology (ICT). These attempts, however, have produced findings that are difficult to generalize to language teachers, and as such a different approach is necessary. Also, these frameworks only focus on a certain part of possible factors, unlike Borg's framework that includes not only contextual factors and teachers' training experience but also their language learning experience.

Thus, Borg's framework fits nicely the purpose of the current study, that is, to examine both pre-service and in-service ESL teachers' beliefs about the use of digital

technology not from the perspectives of educational technology, but from the perspectives of language teacher cognition. In addition, it allows the comprehensive investigation of the possible underlying factors. The following section will discuss the possible factors that influence teachers' beliefs within this framework and explain how the framework is applied for the purposes of this study.

2.3. Borg's framework of language teacher cognition (2006)

In the efforts to address the need for a “unifying overall framework” (Borg, 2006, p. 280) that provides structured guidance for future research in the field, Borg proposed a framework that is specifically designed to conceptualize the relationship between teachers' beliefs and classroom practices under the influence of three other elements: schooling, professional coursework, and contextual factors of classroom practice. In this framework, the term, *teacher cognition* is used as an umbrella term to refer to language teachers' “beliefs, knowledge, theories, attitudes, assumptions, conceptions, principles, thinking, decision-making about teaching, teachers, learners, learning, subject matter, curricula, materials, activities, self, colleagues, assessment, and context” (2006, p. 283).

In order to construct this framework, Borg examined the research, published from 1976 to 2006 containing information on teachers' actual classroom practice and the relationship between their practice and their beliefs within the field of both general and language education. This work provided insight into the beliefs of language teachers at various stages (i.e. pre-service, novice, and experienced), covering various language teaching contexts (i.e. ESL, EFL, L2). The topics of the research ranged from general issues (e.g. instructional decision-making and planning) to particular curricula (e.g. grammar instruction, reading, and writing). The framework is made of four elements that

influence teachers' beliefs, namely, schooling, professional coursework, contextual factors, and classroom practice (See Figure 1).

Figure 1. Conceptual framework of language teacher cognition (Borg, 2006, p. 283)

Schooling. This element refers to teachers' previous learning experiences not only with teachers in schools but also with parents throughout their childhood before they commence their undergraduate studies at university. Johnson (1994) in her study of pre-service ESL teachers found that pre-service teachers relied more on the images of language teaching and teachers that they experienced as language learners. Even though the teachers reported understanding the need to practice teaching methods they learned during the formal teacher education program, they found themselves still using teaching methods they experienced in prior language learning. Johnson (1994) concluded that the pre-service teachers had less procedural knowledge in terms of language teaching, which they could acquire through actual teaching practice, and as a result performed familiar

teaching practices, which they experienced as learners. Peacock (2001) suggested in his three-year longitudinal study of pre-service EFL (Hong Kong) teachers in language teacher education program that there was little change found in the teachers' beliefs about language learning and teaching at the onset of the training to its end. He concluded that language teacher educators should focus more on eliminating the beliefs that the pre-service teachers hold about language learning before entering the program. These results provide evidence that support the notion of "apprenticeship of observation", the term coined by Lortie (1975) who suggested that pre-service teachers' beliefs about teaching are heavily influenced by their previous learning experience (Pajares, 1992). Ashton (1990) argues that pre-service teachers' pre-existing beliefs about teaching determine how they reflect on and react to the training they receive, and eventually their teaching practice in the future. Junqueira and Kim (2013) provide the most recent support for this argument in their study of two ESL teachers, one a novice and the other, experienced. They concluded that the teachers' previous language learning experience remained a powerful influence on the teaching practices of both the experienced and the novice. Therefore, schooling experience is one of the key determiners that affect teachers' beliefs and practices directly and indirectly.

Professional coursework. Any formal teacher training such as teacher education programs for pre-service teachers and professional development courses for in-service teachers are included in this category of elements. As mentioned above, pre-service teachers bring their pre-constructed beliefs about teaching and learning into their formal and specialized education to become teachers. These beliefs often remain too rigid to be changed easily even though teachers are trained during the formal teacher education

(Pajares, 1992). Therefore, for many researchers in teacher education, the purpose of investigating pre-service teachers' beliefs is often to find ways to challenge such beliefs (Clark & Peterson, 1986; Fang, 1996) because if not challenged, during the training, the initially held beliefs will remain unchanged. The beliefs that are not challenged may become problematic when they are not aligned with the current trend of language teaching pedagogy (Johnson, 1992; Fang, 1996). Yet, Nespor (1987) argues that such beliefs can be altered when teachers are not satisfied with their previous beliefs. In other words, teacher educators need to give explicit opportunities for pre-service and in-service teachers "to examine, elaborate, and integrate new information into their existing belief system" (Kagan, 1992, p. 77). When these opportunities are made available for teachers, training can influence teachers' beliefs, and as a result their classroom practices (Nespor, 1987; Fang, 1996).

Teacher education whether it is for pre-service teachers or in-service teachers is an important opportunity for teachers to acquire and develop new knowledge about teaching, teachers, learning, learners, and schooling (Fang, 1996). Tsui (2005) proposed that to be an expert teacher, in addition to prior training and teaching experience, teachers should constantly engage in training during their careers to review and reinforce their teaching knowledge. Therefore, professional coursework (i.e. pre-service and in-service training alike) is an influential factor in the development of teachers' beliefs and knowledge.

Context. Borg (2006) defined contextual factors as "social, institutional, instructional, and physical settings in which teachers work" (p. 275). Similarly, Richards (2012) suggests that context refers rather broadly to "school culture...and a community

of practice” (p. 49) as well as physical infrastructure. Putnam and Borko (2000) agree that understanding teacher professional cultures and interacting with other professionals influence teachers’ beliefs and practices. In fact, Fang (1996) emphasized that teachers’ practices and beliefs should be investigated within “psychological, social, and environmental realities of institutions” (p. 54) where teaching practice takes place. Much research claims that contextual factors affect what teachers do in the classroom. That is, context could promote or inhibit teachers’ abilities to act on their beliefs (Davies, 1982; Fang, 1996; Borg, 2006), making it a mediating factor between teachers’ beliefs and their classroom practice. Thus, contextual factors need to be considered in order to understand the connections between teachers’ beliefs and practices.

Classroom practice. Teachers’ experience of classroom practice relate to their beliefs about themselves as teachers, their students, the subject matter they teach, and the circumstances surrounding their practice. However, as explained in the previous section, this relationship between teachers’ beliefs and practices is heavily influenced by contextual factors, and thus, this element was placed within the contextual factors in the framework.

Classroom practice can also be understood in relation to a teacher’s experience with teaching. Tsui (2005) in her review of expertise in language teaching compared novice and experienced teachers according to the number of years they had taught and suggested that the two groups of teachers showed differences in terms of their knowledge about teaching, students, subject matter and context. The most prominent difference between the two groups of teachers was the flexibility that they showed and exercised in terms of teaching, learners, and context (Tsui, 2005; Richards, 2012). In other words,

experienced teachers were more likely to adapt new information about teaching into their exiting instructional repertoire because they were sensitive to their students' individual needs and abilities and as such, were willing to adjust their teaching styles to accommodate them. Richards (2012) labeled this ability of experienced teachers, "contextual knowledge" (p. 48), defined as the ability to "understand the dynamics and relationships within the classroom and the rules and behaviours specific to a particular setting" (p. 49). Earlier research on language teacher beliefs also found similar differences in pre-service and in-service teachers' practices (Borg, 2006). Johnson (1994), for example, found that pre-service teachers with no previous teaching experience reported having difficulties adjusting their teaching for the various learner styles and classroom circumstances they were faced with. Interestingly, Woods (1996) found that knowledge about contextual factors, such as the number of students in a class and availability of equipment, influenced experienced teachers' instructional practices.

Borg's (2006) framework of language teacher cognition can provide a meaningful unifying framework for understanding the relationship between teacher beliefs and classroom practice because it (1) provides background knowledge and conceptual structure of language teachers' beliefs, (2) points to the key aspects of language teacher cognition, and (3) presents possibilities for further research. Yet, surprisingly, there has been little research conducted within the framework. Nishino's (2012) study of Japanese EFL secondary school teachers' beliefs about communicative language teaching (CLT) is the only study to date that has used Borg's 2003 framework of teacher cognition. Based on this framework, Nishino designed her own hypothesized path model (dubbed "a conceptual model of teacher beliefs and practices") that includes the following elements:

learning experience, pre-service teacher training, in-service teacher training, contextual factors and perceived teaching efficacy that influence the teachers' beliefs about CLT and their practices. She surveyed 139 teachers and carried out interviews and classroom observations with four teachers. After employing a factor analysis and correlation analysis of the questionnaire items ($n = 74$), Nishino further identified the following seven factors that influence the teachers' beliefs about CLT; influence of the Japanese policy about English education (MEXT), exam-related expectations, teacher-related school conditions, and student-related communicative conditions, L2 self-confidence, and CLT self-efficacy. The results of the path analysis revealed that the contextual factors (i.e. exam-related expectations, student-related communicative conditions), CLT self-efficacy, and in-service teacher training strongly influenced the beliefs of the Japanese teachers about CLT. This study provides support for Borg's framework of teacher cognition (2003) by revealing the effects of schooling, professional coursework (in-service training in particular), and contextual factors in the teachers' classroom practice. Yet, though Nishino's (2012) study is informative, there are several reasons that distinguish it from the present study. First, Nishino's study only concerns the Japanese EFL context, so it is not feasible to generalize her findings to the Canadian ESL context. Second, the objectives of Nishino's study are different from the ones of the present study in that the former aimed to investigate the teachers' beliefs about communicative language teaching practices, while the latter looks at the teachers' beliefs about the classroom use of digital technology. Lastly, the current study used the most recent version of Borg's framework (2006) that specifically concerns language teachers, whereas Nishino (2012) adapted the previous version of Borg's framework (2003), which addresses teachers in general.

Thus, for the present study, Borg’s framework of language teacher cognition (2006) is applied as a theoretical framework. Only one modification has been made in that the labels of schooling and professional coursework factors were changed to *experience* and *training* (See Figure 2).

Figure 2. Modified framework of language teacher cognition

Here, *experience* refers to teachers’ personal and professional previous experience with digital technology. *Training*, in turn, includes any formal technology-related training teachers completed during their pre-service training and in-service professional development. In fact, Wozney et al. (2006) identified both teachers’ use of computer technology in their personal lives and their technology-related training, among the factors that influence teachers’ positive beliefs about the use of computer technology in classroom teaching and the frequency of technology use in their teaching practice.

2.4. Language teachers' beliefs and CALL

With abundant information provided by CALL researchers in support of the advantages of implementing technology in education, many educational institutions have started to incorporate technology in the classroom. Yet, teachers' actual use of technology in the classroom appears very diverse and sometimes not very well integrated into their teaching practice (Bax, 2003; Ertmer, 2005; Arnold, 2007; Hubbard, 2008; Garret, 2009). Efforts have been made to understand such diversity in teachers' actual use of technology in the classroom. Among them, Bax (2003) provided an overview of the field of CALL research and categorized CALL practices with the three CALL approaches, namely restricted, open, and integrated CALL (See Appendix E for a detailed description). Restricted approach refers to the early CALL practice, which mostly consisted of activities such as drills and fill-in-the-blank activities, with the least interaction between students. Open approach promotes interaction, but the activities are considered as extra. The last approach, integrated CALL, refers to the teaching practice where technology is a regular feature in the classroom, and the activities promote ample interaction between students and between students and computers. Bax (2003) argues that the current practice of computer-assisted language learning (CALL) showed mixed approaches (i.e. Open and Integrated CALL), and that future CALL practice should aim for normalized integration of technology in classroom teaching. Bax (2003) defines "normalization" as a state where: "technology is so integrated into our lives that it becomes invisible" (p. 25). Further, he emphasized that teachers are the key players in normalizing the use of technology by overcoming their own doubts and fears, adopting new technology, and persevering in the face of difficulty.

Teachers' beliefs, in particular, have become the center of interest for researchers who consider them the key factor in understanding teachers' role in the implementation of technology. Ertmer (2005) suggests that teachers' beliefs, especially their pedagogical beliefs should be investigated first in order to understand how teachers integrate technology in their teaching practices as they influence teachers' decisions significantly. Drawing from general teacher beliefs research (Kagan, 1992), Ertmer (2005) further reasons that if teachers' pedagogical beliefs do not support student-centered curricular using technology, it is likely that it will not be attractive to teachers who have teacher-centered pedagogical beliefs. For example, Hermans, Tondeur, Van Braack, and Valcke (2008) in their study of primary school teachers' beliefs concluded that teachers who value traditional pedagogy more than newly introduced pedagogy (i.e. constructivist pedagogy) tend to have negative beliefs about the classroom use of computer technology. In light of this, many researchers have explored the beliefs teachers hold about the integration of technology in the classroom and found that teachers' beliefs seem to influence their language teaching practices in the classroom (Lam, 2000; Zhao, 2003; Van Braak, Tondeur, & Valcke, 2004; Hew & Brush, 2007; Almekhlafi & Almeqdadi, 2010; Feng, 2012). For example, Lam (2000) in her study of ten L2 teachers in the U.S. found that positive beliefs about the effects of technology use had influenced their actual use of technology. This finding was opposed to her hypothesis that teachers' exaggerated fear towards technology – which Lam called “technophobia” (p. 390) – would influence their decision to use technology in the classroom instruction. Lam (2000) suggested that “technophilic” (i.e., “overly enthusiastic about technology use”, p. 390) institutions should learn what teachers and students really need in terms of the use of technology

prior to the implementation of technology. Similarly, many researchers have identified teachers' positive attitudes toward the use of technology as the determiner in promoting their actual integration of technology in the classroom (Bruess, 2003; An & Reigeluth, 2011; Fook et al., 2011). On the other hand, teachers' negative attitudes can become barriers in the integration of technology, discouraging them from using it, even when it is available. This was the case in the studies of Newhouse (2001) and Karagiorgi (2005) where teachers chose not to use digital technology despite it being readily available. Further, Lei and Zhao (2007) found rather cautious attitudes of American middle-school teachers who did not use technology because they were not sure of the educational and pedagogical qualities that technology could offer.

In sum, whether positive or not, teachers' personal and pedagogical beliefs about the integration of digital technology have a direct connection to their actual use of digital technology in the classroom. Based on this proposition, this study investigated what ESL teachers believe about implementing digital technology in their teaching practice and what the underlying factors that determined their beliefs are. The following research questions guided the investigation.

1. What do pre-service and in-service ESL teachers believe about the use of digital technology in the classroom?
2. What are the sources of those beliefs?

3 Methodology

The present study opted for a mixed methods design that included a survey and a semi-structured interview to determine the beliefs held by the participants regarding the use of digital technology within the classroom. In this chapter, the participants, data collection tools, procedures employed will be detailed. Also, the analyses undertaken quantitatively and qualitatively will be outlined. The procedure of the quantitative data preparation will also be explained.

3.1. Participants

The participants were categorized as pre-service ($n = 18$) and in-service ($n = 17$) English as a Second Language (ESL) teachers. A total of 35 participants completed the online survey and 10 of them (4 pre-service, 6 in-service) volunteered to take part in the semi-structured interview conducted upon the completion of the survey. Although seven participants indicated their current status as ‘other,’ based on the description they provided, they were regrouped either with the pre-service group ($n = 2$, e.g. ‘student enrolled in Linguistics’, and ‘completed Certificate of Teaching English as a Second Language program (CTESL) but not teaching’) or with the in-service group ($n = 3$, e.g. ‘teaching EAP’, ‘worked as a teacher in the past and will teach again’, and ‘self-employed teacher’).

For the present study, the term, ‘pre-service’ was chosen to describe the participants who were, at the time of this study taken, “engaged in initial teacher education programs (at undergraduate or postgraduate level) and who typically [had] no formal language teaching experience” (Borg, 2006, pp. 50 – 51). The term ‘in-service,’ in

turn, was chosen to describe those participants “who have completed their initial training and work in classrooms” (Borg, 2006, p. 75). It was necessary to make the distinction between the two groups of participants for three reasons. First, the in-service teachers, regardless of their teaching experience, tend to show significant differences in their instructional decision-making and classroom compared to those who are still in training programs (Tsui, 2005). Second, although the pre-service teachers accumulate teaching experience as part of their training (i.e. practicum course), this experience is relatively short, especially when compared to the level of the experience that the in-service teachers accumulate throughout their relatively longer years of teaching, and is carried out under close supervision of the host teacher(s) and the practicum instructor. Lastly, the in-service teachers have generally undergone more training than pre-service teachers, often receiving additional training such as professional development courses, in addition to the training they completed as pre-service teachers.

Pre-service and in-service teachers also seem to show differences in their beliefs and practices when it comes to the use of digital technology. These differences might account for the integration of technology being a fairly new trend in higher education. Pre-service teachers are likely to have more experience with using digital technology than in-service teachers due to their relatively younger ages, and as a result, may have more positive attitudes towards digital technology (Besinger, 2011; Smerdon et al., 2000). On the other hand, in-service teachers may possess more knowledge of integrating digital technology in their instruction due to their professional development or may acquire more flexibility in adapting new instructional ideas due to their relatively longer experience of teaching than the pre-service teachers (Borg, 2006; Richards, 2012). In support of this,

Woolard (2012) found that teachers' pedagogical beliefs, which were acquired through their teaching experiences, had a more significant relationship with their use of computer technology compared to pre-service teachers regardless of a later exposure to the technology. Thus, the present study examined the beliefs of both pre-service and in-service teachers in order to determine what these two groups believed about the use of digital technology in ESL classrooms.

3.1.1. Recruitment.

The possible recruitment sites in Ontario (i.e. B. Ed. programs in various universities, various private and public English schools, Teachers of ESL Association of Ontario, Applied Linguistics and Discourse Studies department, and Certificate in TESL program at Carleton University) were identified based on their accessibility and availability. For the present study, many sites were probed, but relatively few people responded. In addition, the initial effort to recruit the in-service ESL teachers of elementary and secondary schools failed due to school boards' decision not to participate, which resulted in an unbalanced population in the in-service group. The somewhat small and unbalanced sample of the participants inevitably raised some concern. However, though unfortunate, there was little to be done, for as Dörnyei (2003) pointed out as a limitation of the survey method: the researcher does not have any control over the number of the participants they acquire since the survey is voluntary and depends entirely on the participants' own decisions to take part in it or not. If the recruitment had worked in the study's favour, the results may have been different.

Before the recruitment was commenced, the research design was cleared by Carleton university ethics board as well as by some of the recruitment sites as a

requirement. The invitations for the survey, along with the information about the study were distributed via email to the target participants at each recruitment site. The participants in the pre-service group were invited through Bachelor of Education (B. Ed.) programs from various universities in Ontario and Carleton University's Teaching English as a Second Language (TESL) certificate program. The B. Ed. programs in Ontario can be divided into three main divisions: primary/junior (Kindergarten – grade 3), junior/senior (grade 4 – grade 8), and secondary (grade 9 – grade 12) which prepare teacher trainees for public schools in Ontario. Since these programs cover general academic subjects (e.g. English, Science, Math, Music, and etc.), it was necessary to identify those students who specifically had interests in teaching ESL. Therefore, this research targeted those students who were looking to specialize in language teaching and were taking language-related courses (i.e. language and literacy) at the time of the study; student teachers who were registered in a TESL certificate programs were also invited to participate. The recruitment letters ensured this by specifying that the eligibility of the participants required them to be interested in and pursuing education programs in TESL. The Carleton University's TESL program is a well-established certificate program for those who have already finished a bachelor's degree or are in a B. A. honour's program. The courses for this program are made up of a combination of theoretical and practical applications related to teaching ESL to adult learners. These courses include classroom methodology, theories of second language acquisition, pedagogical grammar, and a two-term practicum.

For the in-service group, the participants were invited through Teachers of English as a Second Language Association of Ontario (TESL Ontario), public and private

ESL schools, and M.A. in Applied Linguistics and Discourse Studies (ALDS) at Carleton University. TESL Ontario is a well-recognized organization for ESL professionals in Ontario. The organization provides accreditation, professional development opportunities, and research resources to its members. At the time of recruitment, TESL Ontario boasted over 4600 members province wide. The teachers of various public and private language schools were invited to participate as well. Private language schools mostly provide intensive ESL courses for international students and immigrants to Canada across all levels (i.e. beginner to advanced). Graduate students in the ALDS program at Carleton University were also extended an invitation to participate in the study. This MA program offers two streams: TESL and discourse analysis. The recruited MA participants were in the former stream, seeking to broaden their perspectives and skills in the second language field. Some of the students in the program had previous teaching experience or were teaching ESL at the time of the study.

3.1.2. Demographics.

Table 1 summarizes the demographics of the participants (i.e. age, gender, level of learners they teach or intend to teach, and language learning and teaching experience). While the age of the pre-service teachers ranged from 22 to 40 (Mean age = 28), the in-service teachers were mostly in their 30s or 40s (Mean age = 43). There were more female ($n = 12$) than male participants ($n = 6$) in the pre-service group, whereas in the in-service group there was a more balanced ratio (female = 9, male = 8). In terms of the level of learners that the participants had taught or intended to teach, the pre-service group indicated all levels: elementary ($n = 8$), secondary ($n = 2$), and adult ($n = 8$). Notably, none of the participants in the in-service group reported teaching or having had

taught elementary or secondary level learners. Sixteen of them selected adult learners as the level of the students they were teaching at the time of this study, but one participant did not provide an answer.

Table 1. *Demographic information*

		Pre-service <i>n</i> = 18	In-service <i>n</i> = 17
Mean Age		28	43
Gender	Male	6	8
	Female	12	9
Learner level	Elementary (JK – G8)	8	0
	Secondary (G9 – G12)	2	0
	Adult	8	16
	No answer	0	1

3.1.3. Experience with language learning and teaching.

Table 2 outlines the participants' language learning and teaching experiences. Seventeen participants in the pre-service group and sixteen participants in the in-service group reported having had experience in learning second or foreign languages. In the questionnaire, the participants were allowed to report up to three languages they knew or used. In the pre-service group, twelve participants reported having learned two languages and six participants having learned three languages. Among the twelve languages reported, French (*n* = 12) was the most frequent followed by German, Spanish, and Mandarin (each *n* = 3). The in-service participants reported having learned fourteen languages. Five of them reported having learned two languages and five participants learned three languages. As in the pre-service group, French (*n* = 7) was reported most frequently, followed by English (*n* = 4) and Spanish (*n* = 4). The average duration of language learning was 4.2 years for the pre-service group and 6.8 years for the in-service

group.

Table 2. *Experience with language learning and teaching*

		Pre-service <i>n</i> = 18	In-service <i>n</i> = 17
SL/FL learning	Yes	17	16
	No	1	1
Languages learned	French	12	7
	English	2	4
	German	3	1
	Spanish	3	4
	Mandarin	3	
	Japanese	2	2
	Dutch		1
	Hindi		2
	Italian	1	
	Korean	1	1
	Marathi		1
	Polish	1	
	Romanian		1
	Russian	2	2
	Sindhi		1
	Serbian		1
	American Sign Language	3	
	Inuktitut	1	
	Turkish		2
Average duration of learning (year)	1 st	7.3	9.1
	2 nd	2.7	4.3
	3 rd	2.7	6.9
	Total	4.2	6.8
SL/FL teaching	Yes	11	16
	No	7	1
Languages taught	English	11	16
	Russian		1
	Hindi		1
	French		1
Average duration of teaching (year)	1 st	1.5	7.7
	2 nd	3	6.2
	3 rd	2	1.3
	Total	2.1	5.1

In terms of the teaching experience, eleven participants in the pre-service group reported having taught ESL before (average length: 2.1 years), while seven of them reported no teaching experience. Among those who had taught, English seems to be the only language the participants in both groups had taught before. Among the in-service participants, all ($n = 16$) except for one participant had had some teaching experience (average length: 5.1 years). Similar to the pre-service group, English was the language most taught by the participants, but there were other languages (i.e. Russian, Hindi, and French) reported as well.

3.1.4. Experience using digital technology.

In this section, the participants were asked to share their experience with using digital technology during language learning, language teaching, and for personal purposes. The participants were asked to self-rate their proficiency in using digital technology and to outline the types of digital technology that they had used in the past and that they were currently using. The description of the proficiency levels were in order to assist the participant with self-rating. The participants were also asked to outline the purposes for using each of the reported technology types, and to assess the frequency with which they used each type. The proficiency levels and purposes of the use were adopted from Wozney et al.'s (2006) study that examined the beliefs of public school teachers about computer technology in the school, and will be detailed later in the section 3.2.1. Finally, the participants were asked whether or not they had received digital technology-related training. If they had, they were probed about the purpose, duration, and the location of the training they undertook.

The self-rated proficiency of each group is presented in Table 3. Overall, both groups indicated their proficiency higher when using digital technology for personal purposes than for language learning or teaching. As language learners, the pre-service participants (78%) used digital technology more proficiently (intermediate, advanced, and expert) than their in-service counterparts (65%). However, as language teachers, the in-service group (94%) indicated higher proficiency (intermediate, advanced, and expert) than the pre-service group ($n\% = 66\%$).

Table 3. *Self-rated proficiency in using digital technology*

		Pre-service (%) $n = 18$	In-service (%) $n = 17$
Language learner	Unfamiliar	22	29
	Newcomer	0	6
	Beginner	0	0
	Intermediate	39	30
	Advanced	33	24
	Expert	6	11
Language Teacher	Unfamiliar	22	6
	Newcomer	0	0
	Beginner	6	11
	Intermediate	27	30
	Advanced	39	53
	Expert	6	0
Personal use	Unfamiliar	0	0
	Newcomer	0	0
	Beginner	0	0
	Intermediate	27	41
	Advanced	56	59
	Expert	17	0

The purposes behind technology use are presented in Table 4. Fourteen pre-service participants indicated they had digital technology for language learning and teaching. When learning languages, the pre-service participants mostly used digital technology for instructional (e.g. lectures, presentations), communicative (e.g. emailing,

online messaging, video-conferencing), informative (e.g. website search), recreational (e.g. educational games, music, movies), and evaluative (e.g. test, quizzes, assignment) purposes, while for language teaching, recreational purposes were the most favoured. Among these, the least selected ($n = 8$) was the expansive (e.g. simulations, experiments, brainstorming) purpose. In terms of personal use, the pre-service group mostly used digital technology for communicative, informative, creative, (e.g. painting, writing, taking/editing photos/videos) and recreational purposes (each $n = 18$).

Table 4. *Purposes of digital technology use*

		Pre-service ($n = 18$)	In-service ($n = 17$)
		$n = 14$ (77%)	$n = 12$ (70%)
Learning languages	Instructional	14	9
	Communicative	14	9
	Informative	14	10
	Organizational	12	9
	Creative	12	8
	Recreational	14	10
	Evaluative	14	10
	Expansive	11	8
		$n = 14$ (77%)	$n = 16$ (95%)
Teaching languages	Instructional	12	16
	Communicative	11	16
	Informative	13	16
	Organizational	13	16
	Creative	13	14
	Recreational	14	16
	Evaluative	11	16
	Expansive	8	11
		$n = 18$ (100%)	$n = 17$ (100%)
Personal use	Communicative	18	15
	Informative	18	15
	Organizational	17	15
	Creative	18	15
	Recreational	18	15
	Expansive	16	13

In terms of technology-related training (See Table 5), two-thirds ($n = 12$) of the pre-service participants and approximately half ($n = 9$) of the in-service participants reported having completed some kind of training programs (e.g. part of teacher education program, one-time workshop). Among the pre-service participants, two participants completed the training three times and three participants completed the training twice. Only one participant took the training three times and another one took it twice from the in-service group. When asked about the purpose of the training, most of the pre-service group indicated that they took it as a part of the course / program requirement (average duration = 8 months), whereas the in-service group indicated that they completed the training as part of their professional development (average duration = 3 months).

Table 5. *Technology-related training experience*

		Pre-service (%) $n = 15$	In-service (%) $n = 16$
Purpose	Professional development	33	69
	Course requirement	40	13
	Personal Interest	27	25
	Other	0	13
Average duration		8 months	3 months

3.2. Data collection tools

In this section, the overall research procedure and a detailed explanation of the instruments used are presented.

3.2.1. Beliefs questionnaire.

A beliefs questionnaire was developed for this study to examine pre-service and in-service ESL teachers' beliefs about their use of digital technology in the classroom. The questionnaire consisted of three parts: Background information, 31 Likert scale

statements, and two open-ended prompts. This section will present the construction of the web-based beliefs questionnaire, describe each part of the questionnaire and explain the piloting process employed (See Appendix A for the questionnaire administered).

Construction. Questionnaires are the most widely used instruments to research beliefs. In the field of language education, in particular, the Beliefs About Language Learning Inventory (BALLI) was arguably the first and most widely adapted questionnaire about learning foreign languages in the field (Horwitz, 1985, 1988). It was designed to see what language learners generally believed about learning foreign languages. A total of 34 items that dealt with the following five areas were measured: (1) general and language-specific difficulties of learning languages, (2) learners' abilities to succeed in language learning, (3) commonly perceived characteristics of the language learning process, (4) learning strategies and practices, and 5) the learners' purposes and expected outcomes for language learning. In her landmark, Horwitz (1985) suggested that BALLI could be used to conceptualize the beliefs held by student teachers about language learning. Furthermore, these beliefs, which were formed before the student teachers entered teacher preparation programs, were found to have a restricting effect in that they inhibited the teachers' development of new beliefs during the programs. Since BALLI's popularization in the field of the language learning and teaching, many researchers (Lightbown & Spada, 1993; Sakui & Gaies, 1999; Nishino, 2012) have generated their own questionnaires using various points-Likert scale measures to examine the beliefs of learners and teachers (Borg, 2006; Bernat & Gvozdenko, 2005). This approach (using questionnaire) has been found to be useful specifically for conducting studies on a large scale as it is economically beneficial in terms of time and cost and

allows for anonymity of the participants (Bernat & Gvozdenko, 2005). When participants are asked to agree or disagree with a statement in a questionnaire, they tend to react to the statement differently in light of the interpretation they assign to a given statement. This practice can produce unreliable results. However, multi-scale items such as Likert-scale statements can be beneficial in reducing such influences, thus increasing the reliability of the measure (Dörnyei, 2003). Therefore, this study employed Likert scale statements to measure teacher beliefs about the use of digital technology.

The statements were carefully constructed to reflect the research on teacher beliefs in CALL and teacher cognition. However, in spite of the popularity of the questionnaire tool, it is not without flaws. For example, there is a concern that since the participants are presented with items that researchers construct, their responses might be constrained to the researcher's own perceptions and knowledge, leading the participants to possible misinterpretation of the presented items (Bernat & Gvozenko, 2005; Loewen et al., 2009; Kartchava & Ammar, 2013). In an effort to avoid this, open-ended questions/items can offer an opportunity to gather richer data, explaining the source of the participants' real beliefs, unearthing unexpected views that researchers could not predict (Dörnyei, 2003). For example, in a study examining the beliefs of second language learners regarding grammar instruction and error correction, Loewen et al. (2009) used open-ended prompts to explain the yielded quantitative results. The same is true for the current research: the Likert scale statements were effective in conceptualizing the participants' beliefs about the use of digital technology in their classroom, whereas the open-ended prompts offered an opportunity for them to provide possible sources for these beliefs – something that closed-ended questions might not capture.

As technology becomes widely adapted in a wide range of research fields, researchers in the area of teacher and learner cognition started to recognize the benefits of web-based surveys (Debevec, Shih, & Kashyap, 2006; An & Reigeluth, 2011; Besinger, 2011; Chai et al., 2011; Douglas, 2014). Compared to paper-based questionnaires, the foremost benefit of the online-based questionnaires is that they are economical in terms of time and money, convenient to administer, provide higher anonymity as well as better access to hard-to-reach populations (Dörnyei, 2007). On the other hand, there have been some concerns over the samplings produced by these web-based surveys on the grounds that they do not allow a “systematic and purposive sampling” (Dörnyei, 2007, p. 122). This is because, as web-based surveys become available to a larger public, it is likely that researchers will exercise a lot less control over the resulting sampling compared to that of the paper-based surveys. However, in a study of web questionnaires used in second language acquisition and bilingualism research, Wilson and Dewaele (2010) concluded that the difference in sampling did not affect the validity and reliability of the collected data. Gosling, Srivastava, Pand, and John (2004) also found that the results from web-based surveys did not appear “flawed” (p. 102) as predicted by many researchers who doubted the web-based methods, and that the responses appeared even “clearer and more complete” (p. 101) than on a traditional paper-based tool.

Despite these possible and well-acknowledged limitations, the benefits of web-based surveys prevail. The web-based method enables the researchers to distribute questionnaires to a wider range of participants and to collect their responses faster and with minimal costs. Also, for participants, the questionnaires are easily accessible due to the growing availability of personal computers or mobile devices such as laptops,

smartphones, and tablet PCs (Statistics Canada, 2013). Due to these benefits and the need to reach perspective participants residing outside of the Ottawa region, where the study was conducted, an online platform was chosen.

Description. The following section provides details of the three parts in the Beliefs Questionnaire developed for the current study. The questionnaire is broken down into four categories: (1) introduction, (2) background information (i.e. age, gender, experience of learning languages, teaching languages, and using digital technology), (3) two open-ended questions, and (4) 31 Likert scale statements.

Introduction. Before responding to the questionnaire, the participants were presented with the definition of “digital technology.” Similarly to Douglas (2014), this was done to establish a common definition for digital technology among the participants. Since there have been different terms used by various researchers (e.g. computer technology, information and communication technology, educational technology, and etc.), the term was defined as:

- Computers and related devices (e.g. desktop, laptop, printer, scanner)
- Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- Interactive whiteboard
- Digital camera/camcorder
- Internet (e.g. browsing and information sharing, online learning, communication via emails, blog, social networks, audio-/video- conference)
- Educational software and applications
- Other software (e.g. word processing, presentation, data management, webpage design/management)

The definition was shown to the participants to ensure that they understood the parameters of what was meant by digital technology and that they kept the definition in mind as they completed the questionnaire.

Background information. The following items about the participants' background were gathered (1) demographics (i.e. age, gender, and status), (2) experience in language learning and teaching, and (3) experience using digital technology in learning, teaching, and personal life, and (4) experience with technology-related training. First, the participants were asked to indicate their 'status': whether they were teaching ESL or were enrolled in a teacher education program or a TESL program, as well as the levels of the learners they had taught, were teaching or intended to teach (e.g. primary (kindergarten – grade 2), junior (grade 3 – 5), senior (grade 6 – 8), secondary (grade 9 – 12), adult, or other). Then, they were asked to provide information on their gender and age.

Next, the participants' previous language learning and teaching experiences, as well as their experiences using digital technology were probed. First, the participants were asked to provide information about (1) where they learned or taught language(s) (e.g. country, institution), (2) if the language they learned or taught was a second language or foreign language to them or in the context they were teaching it, and (3) the length of their language teaching experience.

Research shows that teachers' experiences in and outside the classroom impact their decision about whether or not to use technology for learning and teaching (Parks et al., 2003; Wozney et al., 2006; Li & Ni, 2011). Therefore, the participants' experiences with digital technology were separated into separate categories of: learning, teaching, and personal use. The participants were asked to self-assess their proficiency (i.e. unfamiliar,

newcomer, beginner, intermediate, advanced, and expert), the purposes of digital technology-related activities (i.e. instructional, communicative, informative, organizational, creative, recreational, evaluative, and expansive), and frequency of using digital technology for each purpose (i.e. daily, weekly, monthly, rarely, and never), as well as to indicate the types of digital technology that they had used in the past and were using at the time of the study. As briefly mentioned earlier, the proficiency levels and types of activities were adopted from Wozney et al. (2006)'s research on the public school teachers' perceptions of computer technology. They suggested that if teachers were made to self-report their frequency and proficiency of using computer technology it could influence how much they integrated computer technology into their teaching practice. In order to better determine their proficiency, they also provided a brief description for each level (e.g. newcomer: I have attempted to use digital technology, but I still require help regularly) and exemplary activities for each purpose (e.g. Informative - using the Internet, website search, reading online journal) (See Appendix A for the description of other levels and purposes). It was in this way that the present study provided the brief descriptions for each level of the proficiency to help the participants assess their technological proficiency; different teaching activities were also provided for the participants to understand each purpose of using. In an effort to get an idea of the participants' past and present use of digital technology, the participants were also asked to select all types of digital technology that they had used in the past and that they were using at the time of the study.

Lastly, the participants were asked to provide information about any technology-related training they had completed. Since the professional development during teaching

practices is another key element that influences teachers' beliefs (Borg, 2006), it was important to find out whether or not the participants had receiving training on how to use digital technology. Wozney et al. (2006) suggested that the amount of technology-related training was related to how much the teachers were willing to integrate computer technology into their practices. In light of this, this study also sought out the details of the training that the participants had completed (i.e. duration, purpose, location) in order to see how much their experiences with digital technology-related training influenced their beliefs about the use of digital technology in the classroom.

Open-ended prompts. The participants were asked to provide answers to two open-ended prompts. The first prompt asked the participants to describe their actual use of digital technology in the classroom, whereas the second prompt sought their views on what would constitute the ideal use of digital technology in the classroom. Wozney et al. (2006), strategically opting for the Dörnyei (2003)'s approach, asked their participants about what their ideal use of computer technology was and how they liked to use resources to improve their (actual) use of computer technology. In other words, they could capture what the teachers really thought about computer technology that the questionnaire might have not capture. Borg (2006) also stressed that the survey takers, whether they are teachers or learners, often answer the questionnaire items based on their ideal views about teaching and learning rather than on their actual practice of teaching or learning. The issue with these ideals is that they may cause confusion for researchers when examining data. In order to avoid such confusion, it was necessary to ask the participants separately about their ideal use and actual use of digital technology in their classroom. Dörnyei (2003) also urges that a well-constructed questionnaire should not

have too many open-ended questions, as they may discourage participants' completion of the survey, recommending instead at least a couple of open-ended questions placed towards the end of the questionnaire. However, in this study, the open-ended items were placed before the beliefs statements. Had these items been placed after the beliefs statements, the information in the statements might have influenced the participants' responses in the open-ended prompts. As such, they were placed at the start of the survey to ensure that the information was unbiased and the responses were a true reflection of the teachers' views on the subject.

Close-ended beliefs statements. A total of 31 statements were constructed for this part of the questionnaire. The statements were measured on a 5-point Likert scale where 1 indicated strong disagreement and 5, strong agreement. The statements were constructed according to three categories of (1) experience with digital technology, (2) expertise in using digital technology, and (3) the context(s) of using digital technology as shown in Table 6. As mentioned earlier, these categories were adopted from Borg's framework of language teacher cognition (2006). The first category, experience with digital technology, was divided into two parts – importance and use – because if teachers' experiences are positive, it is more likely that they will think that using digital technology is important and that they will use it. In order to integrate the participants' perspectives on digital technology use, previous research in the field of educational technology and CALL in relation to teachers' and learners' beliefs (Wozney et al., 2006; Kong & Li, 2009; Almekhlafi & Almeqdadi, 2010; Bourgonjon, Valcke, Soetaert, & Schellens, 2010; Shinde & Karekatti, 2012) was studied and the statements from these studies were examined and adapted based on Borg's framework (See Table 6). The statements were

randomized prior to the administration of the questionnaire (Dörnyei, 2003; Andres, 2012)

– please see Appendix A for the final version of the questionnaire.

Table 6. *Categorized statements*

Category	N	Statement
Experience	Importance N= 12	Q1. I find digital technology useful in enhancing my performance as a teacher in the classroom.
		Q2. I find digital technology useful in improving my students' language skills (i.e. reading, writing, listening, and speaking) when I teach.
		Q4. As a teacher, I am enthusiastic about using digital technology in the classroom.
		Q19. I feel it is important for students to be enthusiastic about using digital technology in the classroom.
		Q20. I feel it is important for students to actively participate in activities using digital technology.
		Q24. The use of digital technology in the classroom limits my abilities as a teacher.
		Q25. I am willing to learn more about digital technology.
		Q27. I feel that it is important to use digital technology in the classroom.
		Q28. I feel that the use of digital technology interrupts the normal classroom activities.
		Q31. I feel that digital technology is beneficial in motivating my students to participate in the classroom activities.
	Use N = 4	Q3. I provide my students with opportunities to use digital technology.
		Q23. I am willing to make digital technology regular feature in my teaching.
		Q29. The use of digital technology makes lessons enjoyable for my students.
		Q30. The use of digital technology lets my students have fun in the classroom.
Expertise	N = 9	Q5. I would describe myself as an early adaptor of digital technology compared to my fellow teachers.
		Q6. I can use digital technology to collect information from a variety of resources.
		Q7. I can use digital technology to facilitate academic learning.
		Q8. When I use digital technology in the classroom, I understand clearly how to use it.
		Q9. I can troubleshoot common problems when using digital technology.
		Q10. I can choose digital technology based on its appropriateness to specific tasks in the classroom.
		Q11. I can use digital technology to communicate with students.
		Q12. When I use digital technology in the classroom, I need help from other staffs.
		Q13. I am confident in using all kinds of digital technology available in my classroom.

(Table continues)

Category	N	Statement
Context	N = 8	<p>Q14. I have access to digital technology in my classroom.</p> <p>Q15. I am satisfied with technical infrastructure in my school (e.g. internet connection, digital technology equipment).</p> <p>Q16. I am satisfied with resources available in my school regarding the use of digital technology in learning and teaching language.</p> <p>Q17. I am encouraged to attend in educational programs regarding digital technology.</p> <p>Q18. Students are encouraged to use digital technology in the school.</p> <p>Q21. The teachers and staff in my school are enthusiastic about using digital technology.</p> <p>Q22. The teachers and staff in my school are encouraged to use digital technology.</p> <p>Q26. The teachers and staff in my school actively use digital technology.</p>

Reliability of beliefs statements. For the ‘multi-item scales,’ such as the Likert scale item that was chosen for this study, reliability analysis is crucial, as it determines the internal consistency between items to see if they “measure the same target area,” and to see if the items are “trustworthy” (Dörnyei, 2007). Therefore, the reliability of the 31 items in Part 4 was measured by each category using the Cronbach Alpha coefficient. The items were measured all together, and then by each category. Negative statements (i.e. Q12, Q24, and Q28) were then reversed before the measurement. The computed values exceeded the minimum value of 0.7 (importance = .742, use = .749, expertise = .757, and context = .860), which meant that the statements in each category were consistent with each other and reliable enough to proceed with the data analysis (Pallant, 2011).

Piloting. It is integral that researchers pilot their questionnaires before their actual administration. This is to ensure that the questionnaires they created produce the intended results (Dörnyei, 2003, 2007). Thus, the questionnaire was tested twice on a similar population to that of the target participants (i.e. pre-service and in-service ESL teachers).

The testers were asked to complete the initial questionnaire focusing on the clarity and appropriateness of the language choices in the instructions and items. The feedback from the testers during the first phase of the piloting provided a chance to change the initial questionnaire in terms of the contents and organization of the items. A revised version of the questionnaire was created and piloted for the second time. This was done using the actual online format of the questionnaire to estimate the completion time as well as to see if the questions were clearly presented and if specific functions such as jumping from a question to another question worked well. After the second piloting, the current version of beliefs questionnaire was finalized and invitations were sent out.

3.2.2. Semi-structured interviews.

Since the questionnaire data may not grasp the realities of what the participants really think and feel the verbal commentaries from participants (i.e. interviews) were employed so that they might provide the researcher with richer and more vibrant data (Brown & Rodgers, 2002; Borg, 2006; Dörnyei, 2007). In fact, the use of such interviews (Prestridge, 2012; Yunus, 2007) and observations (Peacock, 2001; Judson, 2006) are favourable, as they allow the researcher to obtain as much data as possible in order to triangulate the quantitative data (De Groot, 2002; Bernat & Gvozenko, 2005; Nishino, 2012; Sato, 2013). Therefore, this study intended to understand the complexity of the participants' beliefs through their self-expressed thoughts.

A set of prepared questions, which were also rooted in Borg's (2006) framework, guided the interview sessions to uncover the participants' underlying assumptions as well as to understand the sources behind the participants' responses to the belief statements. The questions were developed prior to the interviews based on the results of the online

questionnaire, focusing on (1) the ease of its use (i.e. *was it easy or difficult for you to use it?*), (2) the usefulness of the technology in teaching and learning (i.e. *could you describe an experience when you found digital technology was useful? why do you think it was useful?*) as well as its playfulness (i.e. *do you think your students appear to enjoy the lessons by using digital technology?*), (3) resource and infrastructure (i.e. *do you feel you need more support from your school to help you use digital technology in your classroom?*), and (4) professional development in relation to the classroom integration of digital technology (i.e. *do you feel you need to take courses to help you use digital technology in your classroom?*) (See Appendix C). The purpose of the first group of questions was to find out why the participants found digital technology easy or difficult to use, why they found digital technology useful or not useful, and whether or not they thought digital technology to promote students' engagement in the classroom. The second group of the questions was designed to elicit the participants' expectations in terms of the support that they received at the time of the study as well as to determine the support they needed. The current level of their use of digital technology was addressed in the last group of questions, which asked if the participants were satisfied with their current technological expertise.

3.3. Procedure

The online survey was administered anonymously and the responses were not traced back to a specific participant. After completing part 4 (beliefs statements), the participants were invited to take part in a post-survey interview. Only those who agreed were asked to disclose their personal information (i.e. name, email address, phone number) in order to ensure that the researcher could contact them. To protect their

anonymity, pseudonyms were used when reporting the results. The purpose of the interviews was to give the participants an opportunity to explain their beliefs with more flexibility and freedom, allowing the collection of the more in-depth data. The interviews were conducted at a mutually agreed location on a one-on-one basis and lasted approximately 20 minutes each.

3.4. Data analysis

This section outlines the procedures of data analysis. The questionnaire data (i.e. background information and 31 beliefs statements) was analyzed quantitatively and the two open-ended prompts and the interview data were analyzed qualitatively.

3.4.1. Quantitative analysis.

The completed questionnaire responses were transferred from the survey provider's server (FluidSurveys) to an Excel file for the purpose of cleaning and coding the data using Microsoft Excel 2010 Version 14.0. The prepared data was then transferred to the Statistical Package for Social Science (SPSS) Version 21 for further analyses. Descriptive statistics and correlation analysis were performed to determine if the participants' four categorized beliefs about the use of digital technology (i.e. importance, use, expertise, and context) interrelated with each other, and if any of the participants' background factors (i.e. age, gender, status, total years of teaching language(s), total years of learning language(s), self-rated proficiencies of using digital technology as a teacher, as a learner, and in personal life, and technology-related training experience) predicted the reported beliefs.

In order to be computed in SPSS, text responses such as status (in-service = 1, pre-service = 2), gender (male = 1, female = 2) were coded. The means of the total years of language learning and teaching were calculated and the number of languages learned and taught was also counted. The levels of self-rated proficiency were coded (N/A = 0, unfamiliar = 1, newcomer = 2, beginner = 3, intermediate = 4, advanced = 5, expert = 6). The means of the total duration of technology-related training(s) that each participant completed were calculated. In terms of the 31 Likert scale beliefs statements, first of all, the negative-phrased statements (Statement 12, 24, and 28; See also Table 6) were reversed. The four missing values were identified and replaced by the means of all the nearby points. Because these replaced scores were again tested when calculating mean scores of each participant per category and didn't change the mean scores that were calculated without the missing values, it was decided since there was no effect on the overall structure, to use the newly generated scores to replace the missing values to avoid any error in SPSS and the number of the missing values (i.e. 4) is very small (Dörnyei, 2007). The Cronbach Alpha coefficient values were over 0.70, which showed that the statements of each category were internally reliable for further analysis (Pallant, 2011). The mean scores for each participant were computed per category. In order to ensure the representativeness of the four beliefs variables (i.e. importance, use, expertise, and context), descriptive statistics were conducted confirming that each variable was normally distributed (See Appendix D).

3.4.2. Qualitative analysis.

The responses to the two open-ended prompts (i.e. the participants' actual and ideal use of digital technology) were transferred as a Microsoft Word file for further

examination. The interviews were audio-recorded and transcribed. In order to “find patterns” (Dörnyei, 2007, p. 245) in the participants’ responses regarding the use of digital technology in language learning and teaching, qualitative content analysis (Dörnyei, 2007) was employed in the coding procedure.

4 Results

This study aimed to find answers to the following research questions: (1) what do pre-service and in-service ESL teachers believe about the use of digital technology in the classroom, and (2) what factors influence their beliefs? A web-based questionnaire was administered and post-survey interviews were conducted in search of the answers to these two questions. The quantitative analysis with 31 Likert scale statements (i.e. descriptive statistics) and qualitative analyses with two open-ended prompts and post-survey interviews provided answers to the first of these two research questions, revealing the overall beliefs that the participants held about the use of digital technology in the classroom. In order to find answer to the second research question, another quantitative analyses (i.e. correlational analyses) needed to be performed to determine the relationships between (1) background variables and three beliefs factors (i.e. importance, use, and expertise), and (2) four beliefs factors (i.e. importance, use, expertise, and context), and as a result the possible factors that influenced such beliefs were identified. In addition to the identification of these factors, the findings from the extensive interviews provided in-depth responses and explanations for the sources that were identified through quantitative analysis. Qualitative content analysis was employed in the coding procedure to find underlying beliefs that were as independent as possible from the questionnaire analysis, as the purpose of these interviews was to allow researchers to triangulate the questionnaire data (Caracelli & Greene, 1993; Sato, 2013). However, it was inevitable that the study would necessitate the use of the same typologies (i.e. use, expertise, context) that were identified during quantitative analysis, for the prepared interview questions that were rooted in the same framework (Borg's framework, 2006) as

that of the beliefs statements in the questionnaire (Dörnyei, 2007). The following core themes were found: (1) use (i.e. types of digital technology, purposes of the use), (2) usefulness (i.e. benefits, limitations), (3) expertise (i.e. easy-to-use, difficult-to-use, and training experience), and (4) context (i.e. society, institutions, teachers, students, and supports).

This section will report the findings of the web-based questionnaire and interviews, answering each research question, respectively.

4.1. Research question 1

The following analyses were performed to answer the first research question (i.e. *what pre-service and in-service ESL teachers believe about the use of digital technology in the classroom*). The quantitative measurements (i.e. descriptive statistics) of the 31 Likert scale beliefs statements revealed the overall beliefs that the participants held about the integration of digital technology into ESL teaching. These included: (1) importance (i.e. how much they value the use of digital technology in the classroom), (2) use (i.e. how often they are willing to use digital technology), (3) expertise (i.e. how they assess their knowledge about the use of digital technology, and (4) context (i.e. how they feel about the context where they teach in terms of using digital technology in the classroom). The qualitative analysis of the two open-ended prompts illustrated (1) how the participants actually used digital technology and (2) what they thought the ideal use of digital technology would be. The results from the analysis of interview responses not only provided a snapshot of the participants' actual experience of using digital technology (i.e. types of digital technology used, purposes of their uses), but also revealed their positive and negative experiences with digital technology while teaching

ESL. The results of the beliefs statements, open-ended prompts, and post-survey interviews will be detailed in the following sections.

4.1.1. Findings from the beliefs statements.

The 31 Likert scale beliefs statements were initially generated based on Borg's (2006) framework of language teacher cognition. Previous research regarding teacher beliefs in relation to technology and technological implementation were studied (Wozney et al., 2006; Almekhlafi & Almeqdadi, 2010; Bourgonjon et al., 2010; Shinde & Karekatti, 2012). Some of the statements from these studies were chosen particularly based on their relevancy. During the initial stages of design, it was planned that this study would include a factor analysis to determine the common themes, underlying the participants' responses. However, due to the small number of respondents, it was impossible to conduct the factor analysis as originally planned (Pallant, 2011). Instead, it was decided that the study would examine the means of the beliefs statements per category (i.e. importance, use, expertise, and context). Among the three major measures (mean, mode, and median) of central tendency, the mean is the most important measurement for this study. This is not only because it indicates the "mathematical center" of the data, but because it also allows for the "relative distance of the data from that center" (Rea & Parker, 1992, p. 108). It was in this manner that the mean scores of each participant per category were calculated and later found internally consistent, ensuring that the statements of each category measured the same target. These statements shall be referred to as *beliefs factors* throughout the remainder of this study. Distribution analyses (i.e. plotting) followed the determination and categorization of the belief statements

allowing researchers to ascertain which beliefs were the norm, and which were less common in the distribution.

Descriptive statistics were used to reveal the main features of the belief factors, namely those of *Importance*, *Use*, *Expertise*, and *Context*. The results of these descriptive statistics are shown in Table 7.

Table 7. *Beliefs about the use of digital technology in the classroom.*

Beliefs	Combined			Pre-service			In-service		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Importance	35	3.88	.500	18	3.70	.447	17	4.08	.490
Use	35	3.87	.596	18	3.64	.444	17	4.11	.650
Expertise	35	3.90	.542	18	3.82	.478	17	3.98	.605
Context	35	3.22	.836	18	2.87	.844	17	3.58	.675

Overall, the participants attributed high scores to their use of digital technology in the classroom. The mean scores of *importance* ($M = 3.88$), *use* ($M = 3.87$), and *expertise* ($M = 3.90$) were all close to 4, *Agree*, which could mean that the participants in both groups perceived the use of digital technology positively. However, the in-service group (*importance*, $M = 4.08$; *use*, $M = 4.11$; *expertise*, $M = 3.98$) overall seemed to have more positive attitudes than the pre-service group (*importance*, $M = 3.70$; *use*, $M = 3.64$; *expertise*, $M = 3.82$). On the other hand, the mean scores of the *context* factor were closer to 3, *Neither Agree nor Disagree* in both groups (in-service, $M = 3.58$; pre-service, $M = 2.87$). This could mean that the participants had mixed attitudes about the contextual factors in their classroom practices. These mixed attitudes may be because contexts, such

as technical infrastructures, available resources, professional development opportunities, and the attitudes of teachers and administrators are usually beyond a teacher's control. In recognition of this, it was decided not to examine any further relationship between the participants' beliefs about *context* and their background factors.

4.1.2. Findings from the open-ended prompts.

Actual use of digital technology. In total, 32 out of 35 participants responded to this prompt (pre-service = 16 and in-service = 16). Their responses were categorized into three groups: types of digital technology, purpose of use, and frequency of use.

Generally, the participants from both groups were familiar with various types of digital technology and reported using it in lesson planning, as well as lecture presentations.

However, four participants (pre-service $n = 2$, in-service $n = 2$) reported having had limited access to digital technology in the classrooms due to insufficient resources or unstable Internet connections. One pre-service participant reported that she/he had not had any experience with digital technology so far.

In terms of the types of technology used, some participants ($n = 3$) reported they had used digital projectors / visualizers and touch screen TVs. This was also evidenced in the post-survey interviews. Susan, for example, one of the pre-service interviewees explained how she used a touch screen TV to display lecture contents and to let her students play vocabulary/grammar games as a part of her lessons.

Excerpt 1. The students could look at the TV and the stories (in the textbook) were on that TV. All of the workbook pages were on the TV, so we could answer the questions together. I just typed it (the answer) quickly, and then they (the students) could see the answer. (Susan, pre-service participant)

Other reported types of digital technology included equipment (e.g. SMART Boards, desktop/laptop computers, mobile devices, and computer-labs), Internet and Internet-based applications (e.g. educational websites, YouTube, Google, and online dictionaries, Khan Academy), and general applications (e.g. PowerPoint, Word).

Despite the variation found in the types of technology used by the participants, their purposes for using these various forms of technology, and the experiences therewith were consistent. Among the reported purposes, lesson preparation, demonstration/presentation (images, videos, lectures slides) communication with students, assignments (research project, writings, quizzes), student engagement/participation (in-class activities or games), class management (e.g. attendance) connection with the outside communities (e.g. providing authenticity), and accommodation of students' learning styles and abilities were commonly reported by both groups. This said, there were two variances seen in the two groups' use of digital-technology. Four in-service participants reported that they used digital technology to provide feedback on their students' performance, while no pre-service participants reported using it for this purpose. Additionally, only one of the pre-service participants reported using digital technology to review lessons with students.

Although not many participants ($n = 28$) reported the frequency with which they used digital technology, this seemed to be an area that was important for them nonetheless. Only one pre-service teacher reported using digital technology in every lesson, whereas five participants from the in-service group mentioned that digital technology was a regular feature in their classrooms.

Ideal use of digital technology. A total of 33 participants responded to this prompt (pre-service = 17, in-service = 16). The responses were categorized into uses, needs, and negatives. Generally, both groups recognized that the fast development of digital technology and its growing use in the classroom are inevitable. However, the pre-service participants seemed to show more enthusiasm compare to the in-service participants in their answers, as indicated by the quantity and quality of these responses. Quantity-wise, the pre-service teachers were more forthcoming with their responses and provided many comments on what their ideal use of digital technology would look like. These participants displayed more variation in their answers when discussing their needs and concerns about the use of digital technology in the classroom. This perhaps indicates a stronger need from the in-service participants for these technical aids. The pre-service group's needs concerned themselves with issues of budget, teacher training, and pre-testing on digital technology in addition to the needs that the in-service group identified (e.g. Internet connection, individual equipment supply).

In terms of what the participants' envisioned uses for digital technology might be, the participants from both groups reported that ideally digital technology should be used to provide individualized learning opportunities for students with different learning styles and disabilities. They also mentioned that they would like to use digital technology in ways that promote interactive, dynamic, and collaborative learning experiences for students. It is also notable that two pre-service participants brought up the importance of using digital technology in every lesson to ensure that students could become technologically literate. In addition, one of the in-service participants mentioned that the use of digital technology needs to not only to be merely the replacement of traditional

teaching materials and tools, but a catalyst for the creation of new types of teaching and learning activities. In line with this view, another in-service teacher stated: “Technology should [...] take the traditional classroom experience to the next level.” Several participants from both groups mentioned that digital technology would allow students and teachers to access resources and materials “beyond the brick and mortar of the classroom” and increase language exposure and the chances for students to use languages by connecting with “far-away” and “outside of classroom” communities. The excerpt below represents this view.

Excerpt 2. When they (the students) take the learning a step further, beyond the parameters and limitations of a classroom or school setting...that to me is the ideal use of technology. They integrate it as a component of real life. (In-service participant)

Nevertheless, there were participants who felt that the use of digital technology could put traditional teaching practices at risk, or be a distraction. The following excerpts from the pre-service group illustrate similar concerns that were raised about traditional teaching practices being lost.

Excerpt 3. Students must also learn traditional pen and paper work as well. (Pre-service participant)

Excerpt 4. Old “by the book” teaching methods are still effective. (Pre-service participant)

Excerpt 5. Digital technology does not replace human interaction vital for L2 learning and expression. (Pre-service participant)

The starkest comment regarding the distraction that technology may pose comes from one in-service teacher who attested that: “In the ideal classroom, students would leave their cell phones at the door. [...] (Technology) has become more of a distraction than a useful tool.”

In terms of participant *need*, both groups felt that an abundant access to up-to-date equipment and reliable infrastructure was necessary (e.g. “one tablet for each student”, “ready access to Internet and electricity are necessary”). Three pre-service teachers and one in-service teacher pointed out the importance of having “easy-to-use and set up” (in-service participant) and “feasible” (pre-service participant) digital technology. One pre-service teacher felt that a sufficient budget should be allocated to equip classrooms with digital technology.

In relation to the users of digital technology in the classroom, both groups (pre-service = 1, in-service = 1) expressed concerns that students also needed to know and learn how to use digital technology. Two pre-service participants suggested that teachers should acquire the skills necessary for using digital technology and that they should be trained to critically assess the currently available digital technology in terms of its quality and appropriateness. This was found to be crucial for the participants, as several (pre-service = 3, in-service = 1) pointed out that teachers should “add educational value” (in-service participants) in their uses of digital technology by “testing and improving [it] to accomplish exact pedagogical purposes” (pre-service participant).

Summary. Overall, the pre-service and in-service participants showed similarities in their actual use and ideal use of digital technology in the classroom. Both groups had experienced different types of digital technology and applications, but they generally showed positive attitudes towards digital technology and its role in language learning. In order to successfully implement digital technology in the various contexts of language learning, the participants felt that it was ideal that there be recognition that there is much more to be done. Examples of the steps that should be taken from there include the (1) provision of sufficient and reliable technical support, (2) focused teacher training for the evaluation and application of different types of digital technology, and (3) pre-tested digital technology based on pedagogical purposes. In spite of the overall positive attitudes, some of the respondents expressed concerns over the damage that digital technology could cause to traditional teaching methods, expressing fears that it may be distracting to students during classes.

4.1.3. Findings from the post-survey interview.

Post-survey interviews were conducted with a portion of the participants of the survey (pre-service = 4, in-service = 6). The semi-structured interviews were conducted on a one-on-one basis with the help of a pre-developed question set. The questions included: (1) ease of use, (2) usefulness of digital technology in language education, (3) their opinions about the students' learning experience, (4) their experience with technology-related training and the (5) available supports and resources for using digital technology. The analysis of the interview responses revealed four core themes: (1) use (i.e. types of digital technology, purposes of the use), (2) usefulness (i.e. benefits, limitations), (3) expertise (i.e. easy-to-use, difficult-to-use, and training experience), and

(4) context (i.e. society, institutions, teachers, students, and supports). This coming section will shed light on the first research question, through an analysis of the first two reported themes, use and usefulness.

Use of digital technology. The types of digital technology they used or were using were very similar to the responses found in the web-based survey (i.e. background information and open-ended prompts). Items, such as equipment (e.g. laptop, interactive whiteboard, digital projector, touch screen TV, computer lab), general applications (e.g. MS Word/PowerPoint), educational applications (e.g. online learning solutions, lab-installed programs and games, Learning management systems), Internet, and internet-based applications (e.g. YouTube, Skype) being listed. All of the participants used or were using various types of digital technology regularly in their teaching. For example, Ana, one of the in-service participants specialized in the online delivery of English courses using online teaching applications. Another in-service participant, Dorothy mentioned that she was using the Internet everyday to look for new information and materials to use in her teaching. The remaining four in-service participants also used MS Word and PowerPoint applications to prepare their lectures, and used learning management systems (e.g. blackboard, WebCT) to communicate with their students. They also included other forms of digital technology as part of their lessons. For example, digital technology was evidenced to have been utilized in a research project that aimed at having students make use of websites for learning English, as well as for a project where they were asked to create a website on a certain topic. These tasks, in the eyes of this teacher, promoted the students' research and presentation skills while improving their English skills as well.

Usefulness of digital technology in language teaching. Most of the interviewees agreed that these would most certainly be some of the positive effects of digital technology in language teaching and learning, but they had others to add to the list. In addition to the benefits reported in the open-ended prompts (e.g. authentic materials, connection to outside society, individualization of teaching methods, playful learning experience), the interviewees pointed out the following benefits: (1) promoting autonomous learning, (2) continuous and flexible review of lectures, (3) an easier way to manage class time (e.g. distributing materials, communicating with students, overviewing assignments, providing feedback), (4) instant access to various resources on the Internet (e.g. Google search, YouTube, online dictionaries), and (5) improving language skills (e.g. pronunciation, listening, vocabulary acquisition). The excerpts below will further illustrate the benefits the interviewees witnessed.

Excerpt 6. Learner autonomy

There is a huge online component in this class so we have to do at home 3 hours a week of online work. It is more like a whole program. They [Students] have to listen to the videos and answer things. It is autonomous. They [Students] work on their own. (Sam, in-service group)

Excerpt 7. Continuous and flexible reviews

You never run out of space, so you can show [a student] something, [...] and you can go back, back, back. ... You cannot do that on. They [Students] have to go back on their notes to check. Once you erased [your notes on the board], it is gone. (Sam, in-service group)

Excerpt 8. Class management

I didn't need to distribute [course materials]. They [Students] can just click and download. (Ana, in-service group)

Excerpt 9. Instant access to various resources

Every time we needed some sort of dismal explanation, 'Google' is there to find a picture, or image, whatever we are presenting to give some kind of examples, some kind of cartoon to find somewhere on the internet. It's like a right-there-accessible dictionary basically for everything. (Ana, in-service group)

Excerpt 10. Improving language skills (pronunciation)

When you teach pronunciation, it is easier to use software. That will help [students] pronounce and repeat some words. (Olivia, in-service group)

One of the in-service teachers reported the flexible work time and space that comes specifically from an online teaching experience.

Excerpt 11. We are very flexible. [...] They [Classes] are done from either home or office. [...] Whatever works for the student, that's how we organize our time because that's the point of online. You have to make [the classes] convenient and accessible to the students. (Ana, in-service group)

However, despite all these benefits, the interviewees also experienced some limitations in their use of digital technology. The first limitation was the lack of funding provided for sufficient equipment and resources that would enable them to make proper use of the digital technology in the classroom. Another interviewee also mentioned that

the language program/application that his institution used as a part of their curriculum did not provide a wide range of content, and as a result his students felt bored and showed little interest in completing activities.

Excerpt 12. Then the program is not dynamic enough. It wasn't advanced enough. It needs to broaden the database as twice as it has. [...] It is kind of repetitive, surely repetitive, boring. (Sam, in-service group)

Those who had experience with online teaching also mentioned the personal interaction that can be lost in online-forums.

Excerpt 13. Sometimes you just want to experience that personal connection you would do in a real life situation, but you cannot get that in online learning. (Ana, in-service group)

Adding to this, Olivia had such a trying experience attempting to implement digital technology with her students that she more or less gave up, expressing that it was showing itself to be a nothing more than a distraction, despite her efforts.

Excerpt 14. I found out technology sometimes, it's way too much. Sometimes, it did prevent, even distract because when students have their own laptops, computers, or else during all the lessons, they eventually started to be distracted, like going on Facebook. (Olivia, in-service group)

4.1.4. Summary of the results: RQ 1.

The first research question of this study sought to discover what it was that ESL teachers believed about the use of digital technology in the classroom. The quantitative

analysis of the 31 beliefs statements revealed four belief factors, which in turn, indicated that the participants in this study generally had positive attitudes towards the use of digital technology in ESL classrooms, particularly in the categories of *importance*, *use* and *expertise*.

The qualitative measurements in this study (i.e. open-ended prompts and interviews) showed themselves to be in support of these results as well. The participants were found to already utilize various types of digital technology in their teaching practices, showing their experiences with digital-technology to be positive on the whole. However, it should still be mentioned that it appeared that both pre-service and in-service groups shared concerns that digital technology might become a source of distraction among students and that the valuable and effective traditional language teaching methods might be replaced or devalued by technological methods.

4.2. Research question 2

In order to provide an answer to the second research question, correlative analyses needed to be performed. There were three main reasons for doing so. The first was in order to determine if any of the participants' background factors could predict their beliefs. The second was to see if there were any relationships between the four belief factors (i.e. *importance*, *use*, *expertise*, and *context*). And the last reason for doing so was to see whether or not the findings from the interview data could provide any additional explanations for the sources of their beliefs; explanations, perhaps, that could not be measured by the quantitative measurements alone.

4.2.1. Findings from the correlational analyses.

Background and beliefs factors. Among the background variables, the seven following variables were used: (1) status (pre-service vs. in-service), (2) age, (3) gender, (4) average duration of language learning and teaching, (5) total number of language(s) learned and taught, (6) self-rated proficiency of using digital technology for language learning and teaching and for personal purpose, and (7) average years of technology-related training. The analysis using Pearson's correlation coefficient was conducted on a combined group (i.e. pre-service and in-service groups) and then on the two groups separately. As briefly mentioned earlier in section 4.1.1, one of the belief factors, *context*, was excluded from this analysis. This was done because it was found to be unsuitable for examining any relationships with the background factors, as the contextual factors were beyond the control of the participants. The results are provided in Table 8.

Table 8. *Correlation between background and beliefs factors*

Beliefs	Background					
	Combined		Pre-service		In-service	
Importance	Proficiency as Teachers	.353*	Technology-related Training	.535*	Proficiency as Teachers	.550*
Use	Teaching Experience	.414*	-	-	Proficiency as Personal users	.492*
Expertise	Proficiency as Teachers	.472**	Age	.667**	Proficiency as Teachers	.557*
			Technology-related Training	.556*		

* $p < .05$, ** $p < .01$

In general, the participants' proficiency in using digital technology as language teachers correlated significantly and positively with the beliefs about its *importance* (r

= .353, $p < .05$) and *expertise* ($r = .472, p < .05$). This could mean that those participants that rate their proficiency in using digital technology as high, likely also, believe that using digital technology is important. In addition, these participants may also possess a greater knowledge about how to use it.

The participants' teaching experience also showed a significant positive correlation with beliefs about its *use* ($r = .414, p < .05$). This could indicate that the participants might use digital-technology more frequently if they have more teaching experience. Indeed, just as when the two groups of participants were examined together, the in-service participants also appeared to have a significant positive correlation with their beliefs about its *importance* ($r = .550, p < .05$) and their *expertise* ($r = .557, p < .05$) when measure alone. Their beliefs about the *use* of digital-technology were significantly and positively influenced by their own proficiency as personal users ($r = .492, p < .05$). This seems to suggest that the in-service participants are likely satisfied with their digital-technology in the classroom because they knew well how to use digital technology in their personal lives. On the other hand, it was the pre-service participants' experiences with technology-related training that seemed to correlate positively and significantly with their beliefs about *importance* ($r = .535, p < .05$) and *expertise* ($r = .556, p < .05$). These results could indicate that the pre-service participants who receive more training in the implementation of digital-technology are better able to implement the technology in a classroom, and thus in turn view it as more important. It seemed that age was another strong predictor for the pre-service participants views about *expertise* ($r = .667, p < .01$). This could mean that the pre-service participants believed that the knowledge they had about the use of digital technology varies depending on age. Since the pre-service

participants were not grouped by age in the first correlation analysis, further correlation analysis was performed to determine the direction of the positive correlation. The pre-service group's data was split into two groups, the first of ages less than (range from 21 to 29) and the other age groups over 30 (range from 30 to 40). The results indicated a significant correlation between age and expertise in the younger age group ($r = .797, p < .01$), while there was no correlation found in the older age group. This might suggest that the younger the pre-service teachers are, the more likely they are to assess themselves highly in using digital technology in language teaching.

Beliefs factors. In order to see if the participants' four beliefs interacted, correlational analyses were again performed using Pearson's correlation coefficient. First on the combined group (i.e. pre-service and in-service groups) and then on the two groups separately. The results are displayed in Table 9.

Table 9. *Correlation between four beliefs factors*

		Importance	Use	Expertise	Context
Combined	Importance	1	.655**	.708**	.237
	Use	.655**	1	.610**	.529**
	Expertise	.708**	.610**	1	.140
	Context	.237	.529**	.140	1
Pre-service	Importance	1	.371	.598**	.294
	Use	.371	1	.557*	.711**
	Expertise	.598**	.557*	1	.262
	Context	.294	.711**	.262	1
In-service	Importance	1	.747**	.803**	-.164
	Use	.747**	1	.635**	.214
	Expertise	.803**	.635**	1	-.101
	Context	-.164	.214	-.101	1

* $p < .05$, ** $p < .01$

In the combined group, the analyses showed significant positive correlations between (1) *expertise* and *importance* ($r = .708, p < .01$), (2) *expertise* and *use* ($r = .610, p < .01$), (3) *use* and *importance* ($r = .655, p < .01$), and (4) *use* and *context* ($r = .529, p < .01$). This could mean that if the participants know more about the use of digital technology, (1) they may believe that using digital technology is important and (2) they may use it more, (3) that if they believe it is important, they may use it more, and lastly (4) that their use of digital technology is varied depending on the contextual factors of their teaching practices. In the pre-service group, there were three positive correlations between belief factors that were significant: (1) *expertise* and *importance* ($r = .598, p < .01$), (2) *use* and *context* ($r = .711, p < .01$), and (3) *use* and *expertise* ($r = .557, p < .05$). The first correlation could mean that those pre-service participants with higher levels of technological knowledge believe that using digital technology is important. The second result could indicate that their use of digital technology is under the influence of the context. And through the final result, it could be understood that if they know more about the use of digital technology, they would use it more. There were also three significant positive correlations found in the in-service group between (1) *expertise* and *importance* ($r = .803, p < .01$), (2) *expertise* and *use* ($r = .635, p < .01$), and (3) *use* and *importance* ($r = .747, p < .01$). This could be explained in the same way as when the two groups were examined together. The *context* factor correlated with neither *importance* nor *expertise* in the combined, pre-service, nor in-service groups. This could mean that no matter what the context is it does not affect their beliefs about the importance of using digital technology and their evaluation of their own knowledge about the use of digital technology. This is

especially true in the case of the in-service group, as the contextual factor is found to have no influence at all on the other three factors.

Summary of the correlational analyses. In terms of finding the background factors that influenced the participants' stated beliefs, their proficiency as teachers in using digital technology influenced their beliefs about importance and expertise for both pre-service and in-service groups. This could mean that the more they knew about using digital technology for teaching, the more they perceived the use of digital technology as important. As well, conversely, the more that they believed they already possessed enough knowledge about using digital technology in the classroom, the more likely they would be to wish to do so. Another variable, teaching experience, appeared to influence the participants' beliefs about use. This could mean that the longer they had been teaching, the more likely they were to use digital technology in the classroom. When examined separately, the proficiency of the participants as personal users of digital technology was found to be another key factor that affected the in-service participants' beliefs about use. The more proficient they were in using digital technology personally, the more likely they were to use digital technology in teaching. However, proficiency did not seem to have any relationship with the pre-service participants' beliefs. Instead, the amount of the technology-related training they completed was a much more significant factor for understanding their beliefs about importance and expertise. A possible explanation could be that the more technology-related training pre-service teachers completed, the more they believed they had enough knowledge on how to use it, and the more they believed that using digital technology was important in language teaching. Another factor found among the pre-service group was to do with age, indicating the

younger pre-service teachers perceived more positively their knowledge than the mature pre-service teachers.

In examining the relationships between the four beliefs factors (i.e. importance, use, expertise, and context), it was observed in general that their beliefs about expertise, importance, and use influenced each other. It was in this way that it could be understood that their use of digital technology could depend on how knowledgeable they are about the use of digital technology, and how much they value the use of digital technology. Indeed, these same correlations were found in the in-service group when examined separately. However, in the pre-service group, the use factor did not show any relationship with importance. Instead, the pre-service participants' decision to use digital technology is likely affected by *context* factor. This led to another difference that the context factor that did not have any influence over in the in-service group.

4.2.2. Findings from the post-survey interview.

As with the first research question, the interview data added further explanations for the factors that were discovered through correlational analyses. A total of four core themes (i.e. use, usefulness, expertise, and context) were found during the coding procedure. However, for this section, only the themes, *expertise* and *context* will be reported.

Expertise in using digital technology. The participants' self-reported proficiency in using digital technology as language teachers could be an important factor in understanding their beliefs about expertise and importance in general. Their proficiency as personal users relates to the participants' beliefs about use, especially for the in-service group. The pre-service group on the other hand seemed to be primarily influenced by the

technology-related training they received, its levels affecting how the pre-service group viewed technology in terms of their beliefs about importance and expertise. Therefore, in this section, the participants' proficiency as teachers and as personal users will be focused upon and explained. First through the interview responses outlining the reasons why the participants found it easy to use digital technology, and how they solved the difficulties they encountered while using it followed by their responses to the technology-related training experience. These will be presented to see if it really makes a difference to the participants' beliefs about the importance of using digital technology and their own perceived expertise.

Easy-to-use. Most of the interviewees ($n = 8$) stated it was easy for them to use digital technology for the following reasons: (1) experience using digital technology in personal life, (2) previous experience using digital technology as learners and teachers, (3) expertise in different computer systems, and (4) previous training in relation to the use of digital technology. This could indicate that the participants believed that they already had enough knowledge about the use of digital technology because they had previous experience using it for learning, teaching, and for personal purposes.

Difficult-to-use. Despite the fact that most of the interviewees reported it was easy to use digital technology, there were also reports of some difficulties as well. Most of the reasons for which are beyond their control (e.g. technical and institutional issues), proper attention will be devoted to these later, within the section devoted specifically to context. The in-service group reported other difficulties however, which included (1) lack of knowledge with the use of unfamiliar types of digital technology and with the ways of

integrating digital technology, and (2) different personal preference in terms of using digital technology. The following excerpts represent such difficulties.

Excerpt 15. Lack of knowledge

I think what's difficult, what I personally find it difficult about using technology is trying to think of things you can use technology to accomplish in the classroom that can't be done without technology. [...] So, I think the difficult thing is to try to come up with these creative ways to use it. (Dean, in-service group)

Excerpt 16. Lack of knowledge

In the beginning, it was not very easy because everything was very new to me, and the online concept in general was relatively new concept [at the time].
(Ana, in-service group)

Excerpt 17. Lack of knowledge

Once I worked as online teacher, and I was working on Skype. I found it to be more difficult, much more difficult than teaching in person in classrooms. [...] For example, I can use a mouse when I point objects when I teach names [of the objects]. But, it's not [same like pointing something in person]. I mean, I found it easier for the students as well when they can actually see. (Olivia, in-service group)

Excerpt 18. Personal preference

[I had difficulties using], like a couple of other social media. That was because I don't do that on my own. I was like 'why do I need so many of them?'
(Olivia, in-service group)

The in-service interviewees provided valuable information not only about the difficulties that arose from the use of digital-technology, but also about how they found solutions for the difficulties. Although some of them reported having received help from other staff or peers, other responses indicated that the interviewees had expertise in the use of digital technology that they were able to draw upon to solve the problems on their own (Borg, 2006). For instance, for technical issues such as an unstable Internet connection or insufficient equipment, most of them sought help from others (e.g. other teachers or technology professionals), but a couple of teachers knew how to solve the difficulties by themselves. The following excerpts illustrate these examples.

Excerpt 19. I usually try to solve the problems on my own. [If there is a problem,] I will do something, and test it before my class. (Dorothy, in-service group)

Excerpt 20. Because YouTube is blocked, I had to find other ways to show videos or to play audios to my students. So I had to burn a CD with those materials. (Sam, in-service group)

Training experience. This theme included the interviewees' satisfaction with their training experiences and their perceived need for future training. This training could be interpreted as part of the interviewees' effort to develop their expertise in the use of digital technology (Tsui, 2005). In fact, the interviewees appeared very active in seeking opportunities to improve their knowledge (*Excerpt 21 – 23*).

Excerpt 21. I am always on the look out for new things all the time. (Dorothy, in-service group)

Excerpt 22. I had my BA and MA in teaching English, but I took 6 online ESL courses to experience the difference in online vs. traditional courses, so that I have an idea of what I might be involved in. (Ana, in-service group)

Excerpt 23. What I have done aside from that [mandatory] training, it's really personal, I have written a lot of emails back and forth to the department [in charge of technical supports] to ask them several questions, 'how do I do this, can I do this, here is what I want to do with such and such technology...' (Dean, in-service group)

Despite this effort to further their knowledge, most seemed unsatisfied with the current training available to them. Indeed, they felt they could have improved their expertise if only they had program/application-specific training in order to create technology-integrated activities and more time and opportunities to practice on their own.

Excerpt 24. I would like some instruction that you can use in the classroom [...] basically how to create exercises for students, something like that. [...] Also, though I am not sure if I will be able to teach in online courses. Maybe I needed a specific training. (Olivia, in-service group)

A couple of the pre-service interviewees reported specifically that their training experience improved their expertise (*Excerpt 25*) and even that it changed their attitudes towards the use of digital technology (*Excerpt 26*).

Excerpt 25. If you learn one application and then it can be applied to many other ones. For example, I did have formal training for things like MS office. I think that it really inspired a lot of creativity [in terms of using it for learning and

teaching] when you know how to navigate around systems. (Cathy, pre-service group)

Excerpt 26. We have a lot of guest speakers and a lot of them talked about the use of technology and how students can access, like how communication was with teachers outside class, so they emphasize a lot the importance of the technology. This kind of lectures helped me know that technology can be fun for student [...] and see that sometimes changes [using digital technology] is good. (Rita, pre-service group)

Context of using digital technology. The interviewees' responses to the contextual factors can be divided into five groups: support, society, students, teachers, and institutions.

Support. The support included technical and educational support and resources that the interviewees had access to during their teaching practices. It appeared that technical support was varied depending on the availability and accessibility of the equipment in the different institutions that they taught or were teaching in.

This said, Dean, an in-service participant, seemed very satisfied with the available supports he received from his institution in terms of the equipment, training, and resources provided.

Excerpt 27. I thought here at [school name] where I am teaching, they really have a lot of support. [...] I think technology side, they provide a lot to us. [...]. They offer courses helping how to do online testing, online tasks. (Dean, in-service group)

On the other hand, Olivia, another in-service participant, reported she did not get any support from her school and had to seek and attend training workshops on her own.

Excerpt 28. I didn't really get any support from my schools. [...] It [Attending technology-training seminars] wasn't like my school asked me to do. It was on my own. (Olivia, in-service group)

Further this, Susan, a pre-service participant, shared a frustrating experience from when she taught ESL abroad. She states that her institution did not provide any support, and even asked that she figure out how to use the equipment on her own, and then teach other teachers.

Excerpt 29. They just set up TV in my classroom, saying 'you are going to be a demonstration teacher; here is the password for you to figure out on your computer during office hours.' I was the person who was the first and I had to train other teachers. It was frustrating in the beginning. (Susan, pre-service group)

As found in the correlational analyses, the context factor determined the participants' use of digital technology (See section 4.2.1). As already sampled, many participants in the interviews indicated that problems in technical support became barriers for them when trying to use digital technology. Though they eventually sought help from other staff, or figured out a solution on their own, such barriers surely interrupted their use of digital technology and made for a trying classroom environment. The excerpt below illustrates just such a frustration.

Excerpt 30. So the pen (that came with Smart boards) didn't work on the board and then we ran into huge issues, and then the whole class time was used to solve or troubleshoot everything. (Susan, pre-service group)

Society. Every interviewee indicated that digital technology has become part of our lives. That is, that digital technology has permeated everyone and has touched every aspect of our society (e.g. business, academia, and politics). The interviewees felt it was their duty to learn how to use digital technology and implement it because today's society required them to (*Excerpt 31 & 32*). In fact, one of the pre-service participants, Carry, emphasized her willingness to make digital technology a regular feature of her teaching because she had to as a modern-day teacher.

Excerpt 31. I think we must teach [using digital technology] because that's a part of literacy we are teaching. That's part of computer and digital literacy. (Dean, in-service group)

Excerpt 32. I would be, definitely using [digital technology] in the future, definitely useful to have cause it is a really big, it's not like trends right now, but we kind of have to go with. (Carry, pre-service group)

Students. When the participants were asked about their students' reactions to the use of digital technology in the classroom, most of the responses were positive, saying that their students liked, or even preferred the lessons that utilized it. Some of them also indicated that the use of digital technology could further encourage their students to be involved in classroom activities.

Excerpt 33. It [Digital technology] can be also used to get everyone involved in the classroom. (Cathy, pre-service group)

Those who had experience teaching younger students, in particular, emphasized that their students appeared to have more fun, and as a result, were much more engaged in the activities.

Excerpt 34. There were also games that were available, which the students really liked because, I mean, they were like grammar games, vocabulary games that they liked to do because it was a kind of like playing on an iPad or something. It helped them have fun. (Susan, pre-service group)

Excerpt 35. You can try and make it [lesson] easy through a game. There is always some kind of ESL activities that you can download. [...] With the ESL students of the younger age or lower levels, those activities can be really interesting. They really intrigued them. (Ana, in-service group)

On the other hand, Olivia, mentioned the confusion she observed during a class project where her students were asked to use Facebook or Tweeter as part of a class project. These applications left the students confused as to whether they really could really use them for formal learning, as they are still commonly only used for entertainment

Excerpt 36. I would say especially in the beginning, [...] I found my students, actually quite were confused like because they were used to Facebook, Tweeter, whatever being just for games, just for their entertainment. Once they were asked

to use it for actual learning, it was kind of confusing, like ‘can you do it?’ (Olivia, in-service group)

Teachers. The participants also provided opinions about other teachers’ use of digital technology. One noticeable aspect of which were the mixed levels of digital technology integration. Dorothy’s example illustrates a possible reason why digital technology is used in varying degrees by teachers, or not implemented at all.

Excerpt 37. Computer lab time for a lot of teachers means that they just sit at a desk and they have an hour to kill while their students are busy doing whatever they are supposed to be doing in ESL computer lab time. (Dorothy, in-service group)

It was also mentioned that she often encountered negative attitudes about digital technology being used in the classrooms among her peers, which seemed to play a role in preventing them from learning how to use digital technology.

Excerpt 38. Every time when I walked into the room, I hear again, again and again real negativity from teachers about [digital] technology in the classrooms. (Dorothy, in-service group)

Institutions. The participants also stated that institutional policy could be an influence on their use of digital technology. For some participants, institutional policy was an advantage in that it encouraged the use of digital technology.

Excerpt 39. The students were encouraged to use technology too as part of lessons such as presentation of their project using PowerPoint and other various

applications. (Barbara, in-service group).

Excerpt 40. One thing that I really like is they [the institutions where I taught] have whole set of software and applications that could be very helpful with teaching that are installed in every computer in the school. They have Internet, projectors in every room that I have taught in and they have lab times where we go in. The students can do recordings, and make movies. So, I think technology side, they provide a lot to use [for teachers and students]. (Dean, in-service group)

However, for other teachers it was a disadvantage, in that it provided insufficient funding and adhered to unsupportive policies.

Excerpt 41. The school didn't want to pay for the full funding out the [specific] program, so they got the copy, which caused malfunctions during the classes. (Susan, pre-service group)

Excerpt 42. I am pretty sure with a SMART board that a school has to sign up for it to get a password, to use it. [If a school that I teach doesn't sign up] How can I be even able to practice or use if I cannot access to it? (Carry, in-service group)

4.2.3. Summary of the results: RQ 2.

According to finds from the quantitative measurement (i.e. correlational analyses), proficiency in using digital technology as teachers and as personal users was the primary factor that influenced the in-service participants' beliefs about *importance*, *expertise*, and *use*. These results were supported by the findings from the interview. When the two groups were examined together, teaching experience showed itself to have a strong relationship with beliefs about its use. This could be observed in the interview data, as the

in-service teachers who had longer teaching experience provided more examples and opinions about the use of digital technology. On the other hand, the pre-service group was influenced significantly by their technology-related training experience, when it came to the factors *importance* and *expertise*.

The interview data also revealed that training had positive effects on the participants' beliefs about *importance* (*Excerpt 26*) and helped them to improve their knowledge (*Excerpt 25*). Age when looked at as a factor was also found to have a positive correlation with the *expertise* factor in the pre-service group, although no one in the pre-service group mentioned anything specifically about age in their interview responses. Only one in-service teacher, Dean, mentioned that age could be a reason for the different levels of teacher expertise in using digital technology.

Excerpt 43. I think that, not to generalize, but, I think younger teachers tend to have a higher level of computer literacy and experience. (Dean, in-service group)

Lastly, the participants reported various contexts. These various and different contexts (i.e. technical, societal, and institutional) seemed to affect the participants' use of digital technology, providing environments with both advantages and disadvantages for the pre-service and in-service groups.

5 Discussion and conclusion

The purpose of this study was to examine the beliefs that pre-service and in-service ESL teachers held about the use of digital technology in the classroom.

The results revealed that overall the participants held positive views about the use of digital technology in the classroom, were satisfied with their expertise in using it, and saw it as important in language education. These beliefs also showed themselves to strongly correlate with their learning experience (i.e. technology-related training experience), technological expertise (i.e. proficiency in using digital technology as teachers and personal users), and context. In addition, this study found that the participants' beliefs generally differed in terms of their teaching experience, and their age, specifically.

5.1. Discussion of research question 1

This section will review and discuss the findings that answered the first research question: “*What do pre-service and in-service ESL teachers believe about the use of digital technology in the classroom?*”. First, similarities between the beliefs of the two groups (i.e. pre-service and in-service groups) will be outlined. Following this, the last two parts of this section will focus on how the teachers viewed their actual experience with digital technology and what beliefs about the use of digital technology had shaped these experiences.

5.1.1. Comparison of pre-service and in-service groups.

The findings from the quantitative measure (i.e. 31 beliefs statements) indicated that both pre-service and in-service participants had positive attitudes towards the use of

digital technology in the classroom (See Table 7., p. 5). This is in line with other studies that found overall positive attitudes towards digital technology among its pre-service teachers (Fook et al., 2010; Brush, Glazewski, & Hew, 2008) as well as in-service teachers (Li & Ni, 2011; An & Reigeluth, 2011).

However, it seemed that, compared to the pre-service group, the in-service participants regarded the use of digital technology as more important, and used it more often as a way to make lessons enjoyable for their students. This finding goes against previous studies that suggested that more experienced teachers (i.e. in-service teachers) were less likely to integrate digital technology in their teaching practices than less experienced teachers (i.e. pre-service teachers) (Jones, 2013; Smerdon et al., 2000). Instead, these findings are more consistent with the studies that argued that in-service teachers with more experience (i.e. normally more than five years of teaching experience; Tsui, 2005) showed more flexibility in making pedagogical decisions, adapting new ideas into their teaching repertoire in response to their teaching contexts (Borg, 2006; Tsui, 2003; 2005). Tsui (2005), in her study of expertise in language teaching, explained that one of the characteristics of expert teachers was their flexibility in modifying their pedagogical decisions and adding new instructional ideas (e.g. designated computer lab time) in an effort to respond to their learners', institutions', and society's expectations and demands. As such, teachers with more expertise would be able to incorporate digital technology in improvising their instructions according to the contextual constraints in the classroom.

However, though the in-service group seemed to value digital technology more highly than the pre-service participants, the two groups showed similar attitudes towards

expertise in using digital technology. Both groups appeared confident about their knowledge of how to use digital technology in language teaching (combined, $M = 3.90$; pre-service, $M = 3.82$; in-service, $M = 3.98$; See also table 7). That said, during the interviews, many of the participants expressed a need to learn more about digital technology to understand it and to use it more effectively in their teaching. In addition, when describing their perceived ideal uses of digital technology (open-ended prompt 2), both groups felt they needed more training in how to evaluate critically and utilize appropriately various types of newly introduced technology. This indicates that the participants acknowledged the rapid development of digital technology and its popularity in language education (Levy, 2012; DuBravac, 2013) and felt the urgency to adjust their knowledge to keep up and make informed use of to such phenomena. The following excerpts illustrate such feelings of popularity and urgency.

Excerpt 44. I would like to go into curriculum development especially for online learning because online learning has become very essential part of our lives and it's evident not only in the ESL world, but in mainstream education, like high school. (Ana, in-service group)

Excerpt 45. With the way that things seem to be changing, especially with young kids they all have [digital technology] and it's introduced early. So, it's important for teachers to learn how to do this, how to incorporate the lessons, but training is really necessary. (Susan, pre-service group)

In terms of *context*, both pre-service and in-service groups showed less positive attitudes towards the instructional context they were teaching or were planning to teach in

compared to their beliefs about other factors (i.e. *use*, *importance*, and *expertise*). In light of Borg's framework and previous research on language teacher beliefs, the contextual factors addressed in the questionnaire focused on technological infrastructure, resources, and institutional policies and culture (Richards, 2012). These contextual factors were beyond the participants' control, and as a result, the participants perceived them as barriers they could not overcome on their own. For example, the interviews revealed that technical issues such as unstable Internet connection were the most prominent difficulty experienced and that this issue was felt to require help from other teachers or staff who had technical expertise or who were more familiar with the equipment. Such attitudes about contextual factors could mean that the contexts of using digital technology do not yet meet the expectations of the pre-service and in-service teachers. As with other beliefs factors, the pre-service groups had less positive opinions than the in-service participants. This could indicate that with experience, teachers develop the ability to naturally adjust themselves to specific teaching contexts. Under this premise, those with little to no teaching experience are still in the process of acquiring such abilities (Richards, 2012).

5.1.2. Actual use of digital technology.

According to the results from descriptive statistics (See Table 7), both pre-service ($M = 3.64$) and in-service ($M = 4.11$) participants believed that they were already using digital technology sufficiently in their teaching (statement 3), and were open to using it on a more regular basis in the future (statement 23) (See also Table 6 for the exact statements).

Even though the participants were satisfied with how often they used digital technology, their purposes for using it and the types of digital technology used differed.

Such variety could be evidence in support of Bax's (2003) argument that the practice of CALL among teachers shows diversity (i.e. restricted, open and integrated) in terms of underlying learning theories, types of technology and activities in use, and teachers' role (See Appendix E for detailed description). Such diversity was found during the interviews. For example, Sam, in the in-service group, reported having an online component as his students' home activity. The students logged in and completed certain tasks, and he, as a teacher, only monitored the students' completion of the activity. This could be seen as a restricted approach because there is no interaction with other teachers and the teacher's role is minimum in the learning activity. Rita, on the other hand, one of the pre-service participants, during her practicum had her students exercise their pronunciation activities using a language game in a computer lab. This could be seen as an open approach as it focuses on practicing linguistic skills with little interaction between a computer and other students, but still views digital technology as an option.

The participants in this study generally showed the integrated approach in using digital technology. They reported very diverse types and applications of digital technology for various purposes. The participants reported having digital technology for many purposes such as instructional (e.g. lectures, presentation), communicative (e.g. emailing, online messaging, video-conferencing), informative (e.g. website search), organizational (e.g. record keeping, lesson plans), recreational (e.g. games), and evaluative (e.g. assignments, quizzes) purposes. The responses to the open-ended prompts and interviews also showed the variety of uses in teaching practice, which included everything from lesson planning (i.e. course material preparation) and delivery (i.e. presentation) to interactive and collaborative learning activities (i.e. video-

conferencing with native speakers, group research project). The types of digital technology use varied in terms of equipment (e.g. computers, interactive whiteboard, digital camera, digital projector, touch screen TV), Internet-based applications (e.g. e-mail, Skype, Google, YouTube), educational (e.g. learning management systems), general (e.g. Word, PowerPoint), and other applications (e.g. computer games, music, movies).

The interview data also provided more details about how the participants delivered their lessons using these various types of digital technology. As an example of equipment use, some teachers had designated computer lab time for students to use language applications on computers, while others mostly had access to equipment (e.g. computers, interactive whiteboard, digital projector, touch screen TV) in their classroom. In the case of the applications used, many of the teachers reported using learning management systems (e.g. Blackboard, WebCT) as a mandatory tool to manage their classes, or educational applications that were provided by institutions.

The participants' actual use of digital technology can be seen as evidence that shows the current use of digital technology moving closer to the stage of the normalization (defined as a state when "technology is so integrated into our lives that it becomes invisible"; p. 25) where technology is not regarded as extra but as integral part of a curriculum (Bax, 2003). In the findings, most of the participants reported having technology as a regular part of their face-to-face classroom practice, which can be understood as a "blended learning"(Reinders, 2012, p. 288). In addition, two of the interviewees (i.e. Ana and Olivia) reported having experience teaching in online-

delivered courses where technology is used entirely or regularly for lesson delivery and management (Reinders, 2012).

5.1.3. Importance of using digital technology.

In general, both pre-service and in-service groups believed that the use of digital technology is generally an important and positive development in language learning. The benefits reported by the participants in this study (e.g. access to authentic materials and various resources, individualized teaching, learner autonomy, learner engagement, continuous reviewing) are in line with previous studies that investigated the advantages of digital technology in language education (Li & Ni, 2011; Bruess, 2003). Among language skills (e.g. reading, writing, listening, speaking), many participants agreed that the use of digital technology could benefit learners most by providing them with various listening opportunities. Opportunities provided in the form of authentic and accessible language materials (e.g. audio- and video-clips on YouTube, free online texts), which they found increased the language input for their students (Levy, 2012; Tomlinson, 2012). Indeed, such forms of digital technology can allow these learners to communicate with native speakers other than their teachers (Levy, 2012; Tomlinson, 2012; DuBravac, 2013). Barbara, an in-service participant, explained to researchers that she often used audio materials, such as clips from TV news, as a way to provide her students with an opportunity to listen to other native speakers. Another in-service participant, Dean, also gave an example of a teacher using Skype to connect her students with a native speaker in another country. These examples illustrate the benefit of digital technology in the development of listening, but there were mentioned benefits to speaking as well.

These reported benefits are in line with DuBravac's (2013) study that emphasizes the role of digital technology in enhancing the communicative language teaching approach by enabling teachers to create a diverse range of learning tasks. Indeed, some participants (Sara and Rita) even reported that they witnessed improvements in their students' vocabulary and pronunciation with the help of language applications such as vocabulary games. This is all in line with Levy's (2012) study that found that the benefits of using targeted language application in improving learners' language skills including pronunciation and vocabulary acquisition.

Another positive feature of digital technology reported in this study is the flexibility of time and space that this technology afforded teachers in the management of their classes. For instance, Ana, an in-service participant mentioned that for her, as a teacher, online instruction offered her maximum flexibility in choosing a time and space that convenient to her. She also pointed out that she was able to upload course materials onto the server so that her students could access and review the materials freely whenever necessary. From this it can be seen that the benefits to flexibility that digital technology gives are bi-directional. Reinders (2012), in support of these benefits pointed out that online instruction allows learners to take courses at any time and place. Another in-service participant, Sam, also emphasized the convenience in managing course materials. He explained that the use of an interactive whiteboard made it easy for him and his students to review previously learned materials at any time during lectures (Gérard & Widener, 1999). Such flexibility in managing course materials was seen for these participants as a way to increase opportunities for students to learn autonomously because

digital technology granted them not only access to the learning materials without the need for a teacher's presence, but access to numerous other resources available on the Internet.

The participants also pointed out that digital technology enabled them to modify their teaching depending on the individual learners' needs and abilities. For example, Carry, a pre-service participant shared her experience with one of her students who had a learning disability. This learner showed more progress when using computers in a writing activity than when using pen and paper. Access to visual and audio materials (e.g. Google, YouTube, educational games) was reported as a way to help those students who needed visual supports to understand learning content. Carry explained how using a flash card game on a computer could stimulate visual learners to take part in an activity. Several participants (i.e. Susan, Ana, and Cathy) also mentioned that using educational games was helpful when trying to engage younger students with classroom activities, as the visual stimuli and interactive nature of the game attracted their attention. These findings are in line with other research that suggests the use of different types of digital technology afford teachers' the ability to personalize their practices depending on their students' different learning styles and abilities (Tomlinson, 2012), and furthermore, that it motivates them to engage in learning (DuBravac, 2013; Gee, 2003). Such affordances have been promoted in line with the learner-centered approach in the area of language education (Borg, 2006; Judson, 2006; An & Reigeluth, 2011; Lawrence, 2014). "Learner-centeredness" (Richards, 2012, p. 50) refers to the one of the expert teachers' characteristics that encourages students' participation and interaction and focuses individual learners' abilities and learning. Lawrence (2014) argues that the use of digital technology is a necessary component in today's education to satisfy today's learners'

expectation for digital literacy development. Such opinions were apparent among the participants as well. For example, Dean, one of the in-service teachers, said, “in general digital technology is such a big part of our life [...] so I think classrooms have to reflect students’ lives to a certain degree. [...] We must teach [using digital technology] because that’s a part of literacy we are teaching.”

5.1.4. Cautions in using digital technology.

In spite of the generally positive beliefs about the use of digital technology, the participants in this study also expressed some concerns. The participants were worried about an overuse of digital technology that might replace traditional classroom teaching, emphasizing the importance of having traditional (i.e. “face-to-face” and “pen and paper”) classroom activities in the responses to the open-ended prompts. Another concern regarded the possible isolation of learners due to a lack of human interaction (Tomlinson, 2012; Lawrence, 2014) regardless of the amount of digital technology integrated. As an example, it could be a computer lab time where learners only occasionally complete tasks, or an online course where learners only use digital technology throughout. This is a rising concern that comes with the rapid growth of online learning, particularly among language professionals promoting a “human feel” (Lawrence, 2014, p. 128), which refers to the social interactions that occur between teachers and students or between students in traditional classroom setting. , Supporting this concern is a study of e-learning feasibility by Lawrence, Haque and King (2013) that found that ESL instructors and learners alike felt that face-to-face social interaction with teachers and other students and teacher’s physical presence were crucial and beneficial in language learning and that the e-learning environment caused feelings of isolation among the learners. In fact, participants in this

present study, Ana and Olivia, who both had experience in online instruction, reported having such difficulties due to limited human interaction with learners. This was particularly true for Ana, who had difficulties communicating only via voice and text messages, especially when trying to instruct her students on how to use different tools and options in the online application. For example, when explaining how to ask a question during a class, it would be easier to show students with low language proficiency which option to click to send a message instead of solely instructing them orally or in written messages. Another in-service participant, Olivia, felt she was constrained by the limited space of the computer screen during face-to-face communication via Skype. She related one vocabulary lesson where she found she had to constantly move the camera to show objects that were out of the camera angle, distracting both her and her students.

However, these concerns should not be viewed simply as proof of the limits of the use of digital technology in language education, but rather as a need for it to be attended to so that it may be tailored to the specific situations of the classroom. Some of the participants emphasized that digital technology has to be evaluated prior to its use. This evaluation would need to include educational and pedagogical purposes and values because, after all, the purpose of using digital technology in language education is to improve learners' language skills. A pre-service participant responded, in the open-ended prompts, that "ideally technology is used to help improve student learning and I am hoping to use technology for education value."

5.2. Discussion of research question 2

The second research question involved a discovery of: “the factors of those beliefs [the beliefs of the pre-service and in-service ESL teachers about the use of digital technology]?” To determine these factors, correlational analyses were performed on the (1) four beliefs factors (i.e. *importance, use, expertise, and context*), and (2) background factors (i.e. *age, gender, language teaching and learning experience, technology-related training experience, and self-reported proficiency*) and three beliefs factors (i.e. *use, importance, and expertise*). The analyses of the combined group revealed that teaching experience and proficiency in using digital technology as teachers were the influential factors of participants’ beliefs. When examined separately, the pre-service and in-service groups showed variation in these factors. The correlational analyses within the four beliefs factors revealed that, in the pre-service group, there were correlations between (1) *importance* and *expertise* and (2) *context* and *use* factors. For the in-service group, *expertise* factor appeared to have relationships with *importance* and *use* factors. The identified factors are classroom practice (i.e. language teaching experience and self-rated proficiency in using technology), technology-related training, experience with digital technology, context, and age. These factors will be discussed in detail in the following sections.

5.2.1. Classroom practice.

This element can be explained in relation to two factors found in the results of this study: language teaching experience and *expertise*.

Language teaching experience. As Borg (2006) explained, formal teaching experience is the most prominent difference between pre-service and in-service teachers.

In line with this, the correlational analyses performed on the combined group (i.e. pre-service and in-service groups) revealed that the participants' experience as language teachers influenced their *use* of digital technology in the classroom (See Table 8). This is unlike previous research that did not find the link between teaching experience and teachers' beliefs about technology (Jones, 2013). According to Shulman (1987), more experienced teachers (i.e. in-service teachers) acquire a crucial component of teaching, that is, pedagogical reasoning skills mainly through teaching experience. Such skills enable teachers to make instructional decisions about how to adapt materials and tools to their pedagogical goals and learners' needs (Tsui, 2005; Richards, 2012). This study provides support for this type of research showing that the more teaching experience the teachers accumulated throughout their career, the more likely they are to utilize digital technology as materials and tools for their teaching practices.

Self-rated proficiency. Since teachers' knowledge about teaching is acquired not only from formal training experience but also from their actual classroom practices (Borg, 2006; Richards, 2012), participants' classroom practice can be explained as one of the influential factors for their beliefs about the use of digital technology in the classroom in relation to their expertise of using it in language teaching. The findings indicated that *proficiency* in using digital technology as teachers and *expertise* were found to influence the in-service teachers' beliefs about the use of digital technology in the classroom (See Table 8 & 9). This is in line with other research that suggested the importance of having specific expertise when using digital technology in the classroom (Chai et al., 2011; Prestridge, 2012). Both of these studies found that teachers' knowledge, specifically in regards to technology, led to the more favourable attitudes of teachers towards the use of

technology in the classroom. Supporting this, Prestridge (2012) uncovered that a teachers' competency (i.e. how much they know) and confidence (i.e. how proficient they perceive themselves to be) in terms of their use of digital technology (particularly, information and communication technology) was an important factor in determining their beliefs about integration of digital technology. Reinders (2012) also pointed out the importance of acquiring specific knowledge (i.e. ability to use specific software and to utilize online materials) for language teachers to integrate digital technology in their teaching practices.

5.2.2. Technology-related training.

This study showed that technology-related training experience affected the *importance* and *expertise* the pre-service teachers assigned to the use of digital technology. This finding is also in line with other research on pre-service teachers' beliefs that examined how the pre-service group perceived their teacher training experience (Johnson, 1994; Fang, 1998; Borg, 2006). Specifically, Johnson (1994) argued that because pre-service teachers lack actual teaching experience, they tend to follow what they learned about teaching and being a teacher from their teachers. This illustrates how important pre-service teachers perceive their training experience and how much they rely on it when they teach in the classroom. Lortie (1975) introduced the notion of "apprenticeship of observation" in order to explain such tendencies of pre-service teachers. According to this notion, experiences with teachers and parents shapes pre-service teachers' beliefs about teaching and can act as a strong influencer when they are in teacher education programs. Recently, Junqueira and Kim (2013) found that even an experienced teacher with more than 20 years of teaching ESL was constrained in the beliefs that were shaped during her language learning experience. This study supports

and emphasizes just how strongly Lortie's "apprenticeship of observation" impacts teacher's beliefs.

On the other hand, Fook et al. (2011), showing the rather positive effect of the "apprenticeship of observation", found that pre-service teachers in Malaysia believed that they benefited from their technology-related training experience, and as a result showed positive attitudes towards the use of technology. This present study supports these positive beliefs, as it also shows how positive training experience can lead to the positive attitudes of teachers. Two pre-service participants reported that their technology-related training experience helped them improve their knowledge and change their attitudes about the use of digital technology (See *Excerpts 25 & 26*).

In spite of the fact that training experience was not found influential in the in-service participants' beliefs, their voluntary and active attempts to seek training opportunities are notable, as they may indicate that they believed that the use of digital technology has become a more important component in their teaching in response to the rapid change of digital technology in language education (Kern, 2006). Particularly, many of the in-service participants appeared to have sought help and training opportunities on their own to develop their expertise. Ana, an in-service participant, took online courses to learn how to teach online (See *Excerpt 45*), and Dean, another in-service participant, explored the best ways of using digital technology by seeking additional help from a technology specialist in his school and adapting it to other teachers' practices. This inclination, to put extra effort into the development of their expertise in the use of digital technology, is an important characteristic of expert teachers, which distinguishes them from the non-expert teachers (Tsui, 2005). In fact, Wozney et al.'s

(2006) study supports this finding, concluding that in-service teachers considered the amount of technology-related training as influential in the use of computer technology in the classroom.

5.2.3. Experience with digital technology.

The participants' experience with digital technology can be understood through their self-reported proficiency in using digital technology as personal users, particularly in the in-service group. As reported in the results of the correlational analyses, their proficiency as personal users interrelates with their beliefs about use. This could mean that their personal experience of using digital technology influences their use of digital technology in the classroom. The participants during the post-survey interviews also reported that it was easy to utilize digital technology in their teaching. When asked why they found it easy, two in-service participants (Dean & Dorothy) suggested that it might be because of their long experience using digital technology in their personal and professional lives. These are in accordance with a study of public teachers' perceptions about computer technology integration in Quebec (Wozney et al., 2006). In the study, Wozney et al. (2006) found that the teachers' personal use of computer technology was one of the factors that affected their perceptions in terms of incorporating computer technology in the classroom.

On the other hand, the beliefs of the pre-service teachers did not seem to be affected by their previous personal experience of digital technology. This is echoed in previous research in relation to the use of digital technology as well (Hayes & Ohrnberger, 2013; Fook et al., 2011). Hayes and Ohrnberger's (2013) study aimed to uncover the relationship between previous experience playing digital games and the

actual use of digital games in teaching among pre-service teachers. Their findings showed how the “apprenticeship of observation” (Lortie, 1975) could work unfavourably towards the integration of digital games in the pre-service teachers’ practices. They concluded that previous experience with gaming did not influence the pre-service teachers’ beliefs about the importance of technology in general, nor did it affect their instructional decisions about the use of digital games. In other words, because those pre-service teachers were not taught using digital games, only experiencing them for entertainment, and not for learning, they were not likely to decide to use digital games in their teaching practices even though it was available for them to use. Similarly, in this study, some of the participants during the interview expressed concerns such as the overuse of digital technology and emphasized that traditional teaching methods (e.g. face-to-face and pen-and-paper) are also important. Such cautious attitudes indicate that they are still constrained to their previous learning experiences, where digital technology was not used as much as today.

5.2.4. Context.

In this study, the *contexts* refer to any “social, institutional, instructional, and physical settings in which teachers work” (Borg, 2006, p. 275). Similar to the previous studies (Borg, 2006; An & Reigeluth, 2011; Li & Ni, 2011; Bauer & Kenton, 2005), this study found evidence that the *contexts* could support or constrain the teachers’ beliefs about the use of digital technology, specifically among the pre-service participants (See Table 9). The reason why such a factor appeared predominantly only in the pre-service group is because the in-service participants with more teaching experience already

acquired the contextual knowledge which enabled them to adapt to various teaching contexts (Richards, 2012).

However, pre-service participants with limited experience might be constrained within a certain context that they are familiar with and harbour negative attitudes towards contexts they have experienced with (Johnson, 1994). The lower mean score among the pre-service group in the beliefs of *context* illustrate the different perceptions between the two groups. It may be because, as Borg (2006) and Tsui (2005) suggested, the pre-service teachers were not yet flexible enough to adapt their teaching practices in the contexts which differ from the ones they are accustomed to.

On the other hand, even though it did not appear as a factor when examined separately during the correlational analyses, the qualitative data (i.e. open-ended prompts and interviews) revealed that, similar to the pre-service group, the in-service group considered contexts such as Internet connection as challenges that limit their teaching practices. Such responses indicate that unfavourable contexts can limit teachers with positive attitudes towards the use of digital technology. This is in line with the study of Bauer and Kenton (2005) that found that limited technical and institutional support were the factors that constrained teachers' integration of technology in the classroom despite their high motivation and expertise. In addition to this, the participants in this research expressed concerns over the limited funding and time for additional teacher training. This could suggest that the in-service teachers also need comprehensive and focused training opportunities in terms of integrating digital technology in the classroom (An & Reigeluth, 2011).

5.2.5. Age.

The results from the correlational analyses revealed that the younger group of pre-service participants' (age 21 to 29) beliefs seemed to be influenced by *age*, especially in terms of expertise as a factor. This data is a contribution to the body of research on beliefs, in that previous research did not find any influence of age on teachers' beliefs (Robin & Harris, 1998). This result finds support in Bruess' (2003) study of university ESL instructors' beliefs about the use of computer technology, where she found that the younger the teachers, the more proficient they assessed their knowledge in using computer technology. A more recent study (Feng, 2012) also found that younger teachers seemed to be more familiar with the use of digital technology, thus showed more willingness to use it in their future practice. This could be explained once more in relation to Lortie's (1975) "apprenticeship of observation", as the younger participants experienced the use of digital technology in the classroom as learners more than the mature participants who did not have as much access to digital technology. Even though the sample size for correlation found between age and expertise in this study was small ($n = 11$), age could play a role in the perception of expertise among teachers. Future research should investigate this relationship further.

5.3. Summary of discussion

The aim of this study was to examine what beliefs pre-service and in-service participants hold about the use of digital technology and what factors influence such beliefs. In general, the two groups shared positive views on the use of digital technology in the ESL classroom in terms of *importance*, *use*, *expertise*, and *context*. However, the in-service group showed more positive attitudes than the pre-service group. Such a gap

between the two groups' beliefs seemed especially noticeable in terms of *use* and *context*. This could be because the pre-service teachers have relatively less teaching experience than the in-service teachers, and as a result, do not acquire the necessary knowledge and skills needed to apply different forms and types of applications of digital technology in their teaching under the given contexts (Johnson, 1994; Tsui, 2005; Borg, 2006; Richards, 2012).

In light of this finding, it seems natural that technology-related training experience was found to be an important factor in influencing *importance* and *expertise* among the pre-service teachers, particularly as they tend to rely on their previous training experience (Lortie, 1975) due to their relatively low levels, or the lack of, teaching experience. The age factor was also found to be significant in the beliefs of the pre-service teachers. Especially, the younger participants aged from 21 to 29 who felt more confident about their expertise in using digital technology. This confidence might be seen as being due to the younger participants' exposure as learners to the use of digital technology in the classroom, as they felt they knew enough about it even though they did not have the opportunity yet to develop their expertise through actual teaching experience.

Context was inevitably found in this study to be another factor that influenced beliefs about *use* among the pre-service teachers. As briefly mentioned above, the pre-service teachers are more influenced by contextual factors because they do not know how to adapt their teaching to unfamiliar contexts. This is in contrast to the in-service teachers who already learned how to deal with such conditions through actual teaching practices. Richards (2012) called this kind of knowledge "contextual knowledge" (p. 48), finding it to be one of the characteristics of experienced teachers, which enable them to

“understand the dynamics and relationships within the classroom and the rules and behaviours specific to a particular setting” (p. 49).

Among the factors, the most influential one found in the in-service group was their self-reported proficiency in using digital technology as teachers and personal users. In other words, as long as the teachers are confident and knowledgeable about the use of digital technology, it is likely that they would also maintain their positive attitudes towards the use of digital technology in the classroom. Interestingly, the interview data revealed another possible factor, technology-related training, which influenced the in-service teachers’ perceptions of their expertise. It could be interpreted from this that the in-service teachers perceived the technology-related training as a means of developing their expertise (Wozney et al., 2006).

To conclude, the aforementioned findings of this study are a contribution to the other research that found the important role that expertise plays in a teacher’s beliefs regarding the integration of digital technology in the classroom (Prestridge, 2012; Wozney et al., 2006). This study supports the notion that both pre-service and in-service teachers maintain positive attitudes towards the use of digital technology in the classroom, and that learning experience, teaching expertise, and context are the factors that determine such beliefs.

5.4. Implications

The findings of this study are meaningful theoretically and pedagogically. The following sections will discuss how this study contributes to the body of teacher cognition research and in teacher education.

5.4.1. Theoretical implications.

The research that examined teachers' beliefs regarding the use of digital technology in the classroom placed their theoretical basis mostly within the frameworks prevalent in technology integration research (e.g. Technological Pedagogical And Content Knowledge Model, Chai et al., 2011; Expectancy-value theory, Wozney et al., 2006; Critical theory of technology, Van Orden, 2010). These frameworks mainly looked at the teachers' competence in their ability to use digital technology in their teaching. However, these frameworks do not consider teachers' background, motivation, context, and previous experiences in examining their beliefs about the use of digital technology. Therefore, this study posits within a framework that is specifically designed for language teachers; principally Borg's (2006) framework. The results suggest that the four elements (i.e. experience, training, classroom practice, and context) are influential in guiding pre-service and in-service teachers' beliefs regarding the use of digital technology. Although Borg's framework has been used before to study teachers' beliefs within communicative language teaching approach (Nishino, 2012), Nishino looked at the EFL (Japan) teachers' beliefs about a specific teaching approach, not the use of electronic resources in their teaching practice. This is the first time that it has been applied to a study of the beliefs about the use of digital technology among ESL teachers. As such, this research provides additional support to Borg's framework in the realm of teacher cognition.

Furthermore, this study strengthens the validity of the framework within the ESL context. Finally, since digital technology has permeated every aspect of life in modern society, this study has cast a wider net in determining the factors (i.e. teaching experience, technology-related training experience, age, context, self-assessed proficiency in using

digital technology as teachers and personal users) from the teachers' personal life that can affect the pedagogical choices they make in their classroom. Specifically, training and self-assessed proficiency in the use of digital technology seem to originate in the teachers' personal experience with technology outside the classroom. In fact, Wozney et al. (2006) found these two factors as predictors of teachers' implementation of digital technology in their teaching. Hence, this study contributes to the framework by suggesting that personal experience not related to teaching can impact how one goes about "teaching, teachers, learners, learning, subject matter, curricula, materials, activities, self, colleagues, assessment, context" (Borg, 2006, p. 283).

5.4.2. Pedagogical implications.

This research is meaningful for teacher educators, administrators, and teachers because it points to the possible factors that may affect the teachers' beliefs about integration of technology in the classroom (Judson, 2006). Teacher educators will especially find the findings from this study useful because they rally to the prospective teachers' appreciation and needs to be educated in forms of digital technology that are tailored to one's teaching.

The major implication of these findings for school administrators could be found in relation to the participants' expressed need for ongoing and customized training in the use of digital technology regardless of their experience level. In fact, several pre-service teachers pointed out that one-time workshops or courses were not enough to get a proper grasp of how to utilize various types of digital technology in their teaching. Instead, they stressed the importance of having enough opportunities to actually use digital technology for their own instructional purposes and needs instead of listening to others' experience

or watching instructional videos. Indeed, as Salaberry (2001) emphasized, the purpose of technology-related training should be not just to help teachers access resources and information, but also to support their actual use of technology in the classroom. Therefore, teacher educators and administrators alike should develop training opportunities for both pre-service and in-service teachers that educate them in how to evaluate digital technology critically and how to apply it effectively to create technology-enhanced language teaching practices.

Finally, teachers themselves can draw from this study the opinions of their peers in regards to the use of digital technology, discovering also how they implement or wish to implement it in their teaching. It is well known that teachers influence each other's practice, and that they share their knowledge and beliefs with peers (Richards, 2012). Exposing these beliefs may lead to new innovations and the breaking down of preconceived notions. In fact, one of the in-service participants in this very study commented that she was challenged by widespread technological negativity among her peers to urge teachers to: "embrace technology and bring it in our classroom instead of fighting against it".

5.5. Limitations and future directions

Even though every effort was made to diminish possible flaws in this study (i.e. combination of quantitative and qualitative data), it was inevitable that it would have some limitations. This section will be devoted to a discussion of these limitations and suggestions for future research.

5.5.1. Number of participants.

First, it was hoped that more participants would be recruited for this study as it aimed to determine the beliefs and factors that influence both pre-service and in-service ESL teachers' attitudes towards the use of digital technology. However, despite the fact that every effort was made to invite participants, only 35 agreed to take part. The desire for a large number of participants stems from the desire to conduct a factor analysis that provides the most statistically reliable and valid representation of what Ontario ESL teachers believe about the use of digital technology in the classroom. Due to the small number of participants that this study ended up with, the findings of this study could not be generalized (Dörnyei, 2007). Future studies should make use of a larger sample to build on the findings of this research.

5.5.2. Sampling.

The responses in this study could be biased because the participants were self-selected volunteers. They could be biased on the following grounds: (1) it stands to reason that only motivated teachers may be interested in participating in this study, (2) that only participants who found the subject matter interesting would participate, and (3) that only individuals with access to digital technology could participate (the survey was only available online) (Dörnyei, 2003, 2007). These four possible biases could be linked to the overall positive attitudes found towards digital technology and its use in teaching. Future research should aim to diversify the sampling by including teachers from various institutions, geographical locations and experience levels. They should also make a paper

version of a questionnaire available to those participants who might not have access to the appropriate form of technology.¹

5.5.3. Questionnaire.

Many researchers have raised concerns about the limitations of online surveys. These limitations are due to the fact that the items have been designed by researchers and, as such, might not represent the participants' views with the desired accuracy (Bernat & Gvozenko, 2005; Borg, 2006). One way to counteract possible misinterpretation is by including open-ended items in the survey (Dörnyei, 2003, 2007). This is exactly what was done in this survey, which included pre-made statements and open-end prompts. In addition to these, semi-structure interviews provided supports for the explanations of opinions expressed on the pre-made statements (Borg, 2006; Bernat & Gvozenko, 2005). Moreover, the questionnaire was piloted twice before administration to ensure the validity and clarity of the statements, as well as the functionality of the online environment.

To triangulate the findings further, future studies could include classroom observation as an additional measure in order to validate the participants' reported use of digital technology in the classroom. Such observations may confirm or find irregularities in the participants' perceived and actual use of digital technology (Judson, 2006). Finally, a similar questionnaire could be administered to other stakeholders in technology integration such as teacher educators, school administrators, or caregivers to determine the beliefs about digital technology from various perspectives.

¹ It is important to note in this study a paper version of the questionnaire was made available. However, none of the participants took advantage of this, possibly because they already had access to digital technology, and felt positive about using it in their personal and professional lives.

5.5.4. Self-assessed proficiency.

To determine the participants' expertise in the use of digital technology, they were asked to rate themselves in terms of their proficiency in the use of digital technology in their personal and professional lives. Six levels of proficiency with brief description for each (adapted from Wozney et al., 2006) were used. It was assumed that the participants would be able to make use of the definitions to rate themselves appropriately. However, as Dörnyei (2003) pointed out, individuals perceive the same word differently, and might respond differently from what researchers expect. Furthermore, it is somewhat dangerous to rely entirely on the participants' reported proficiency because individual participants use digital technology in different ways and may have various criteria in terms of assessing the reported proficiency. Thus, the self-assessed and reported proficiency used in this study perhaps cannot be regarded as the most reliable source to determine the participants' expertise. To increase the reliability of the proficiency as a factor of ESL teachers' beliefs about the use of digital technology in the classroom, a more precise measure of the participants' proficiency might be necessary. Future research might choose to include a technology-specific framework such as TPACK (Technological Pedagogical and Content Knowledge; Chai et al. 2011) to determine the participants' proficiency and ability to integrate digital technology.

5.6. Conclusion

This mixed-method study suggests that ESL teachers generally hold positive attitudes towards the use of digital technology. These beliefs are influenced by the participants' experience with digital technology, training in digital technology as well as classroom practice, and the context(s) of digital technology use. These findings not only

validate Borg's (2006) framework of language teacher cognition, but also highlights the needs experienced by pre-service and in-service teachers alike. This research brings to the forefront important practical and pedagogical implications for all the stakeholders in education – learners, teachers, administrators, and policy makers.

Appendices

Appendix A. Beliefs questionnaire²

TITLE

The use of digital technology in the classroom: What the ESL teachers believe about the use of digital technology in the classroom of elementary, secondary, and adult learners

ONLINE CONSENT FORM

Date of ethics clearance: December 4, 2013

Ethics Clearance for the Collection of Data Expires: May 31, 2014

This is a study on the ESL teachers' beliefs. This study aims to examine what the ESL teachers believe about using digital technology in their classroom. The researcher for this study is Seunghye Chung in the department of Applied Linguistics and Discourse Studies at Carleton University. She is working under the supervision of Professor Eva Kartchava in the department of Applied Linguistics and Discourse Studies at Carleton University.

This study involves one 15 - 20 minute online survey. By clicking the "continue" button at the bottom of this page, you consent to participate in the study. You have the right to end your participation in the survey at any time, for any reason, up until you hit the "submit" button. You can withdraw by exiting the survey at any time before completing it. If you withdraw from the study, all information you provided will be immediately destroyed. As the survey responses are anonymous, it is not possible to withdraw after the survey is submitted.

All the research data will be encrypted and password-protected. The company running the online survey is FluidSurveys, which is based in Canada. FluidSurveys will store the

² Please note that the beliefs questionnaire was administered online and that the format of the questionnaire presented here is modified from the online version for a better display on paper.

survey responses on its server in Canada and will not access the data. The stored data will be encrypted and protected by McAfee Secure until I transfer the data. Once the survey is complete, FluidSurveys will delete the data from its server. The collected data will be accessible only by my supervisor and me. No names or IP addresses will be linked to any of the data provided. Once the project is completed, all research data will be kept for five years and potentially used for other research projects on the same or relating topic. At the end of five years, all research data will be securely destroyed. If you would like a copy of the finished research project, it is recommended that you contact either the school you are working for or me.

This project was reviewed by the Carleton University Research Ethics Board, which provided clearance to carry out the research. Should you have questions or concerns related to your involvement in this research, please contact:

REB contact information:

Professor Andy Adler, Chair Professor Louise Heslop, Vice-Chair
Research Ethics Board, Carleton University,
1325 Dunton Tower 1125 Colonel By Drive, Ottawa, ON K1S 5B6
Tel: 613-520-2517 Email: ethics@carleton.ca

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ACTIVE CONSENT

I have read and understood the request to participate in the study of the ESL teachers' beliefs about the use of digital technology in the classroom and ...

- ☐ I consent to participate in the online survey.
- ☐ I do not consent to participate in the online survey.

INTRODUCTION

Thank you for participating in this survey. Your responses will shed light on the ESL teachers' views about the use of digital technology in the classrooms of elementary, secondary, and adult learners. Please express your thoughts freely and answer ALL the questions. Thank you!

Please note that in this survey, the term, 'digital technology' refers, but is not limited, to the following:

Computers and related devices (e.g. desktop, laptop, printer, scanner)

Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)

Interactive whiteboard

Digital camera/camcorder

Internet (e.g. browsing and information sharing, online learning, communication via emails, blog, social networks, audio-/video- conference)

Educational software and applications

Other software (e.g. word processing, presentation, data management, webpage design/management)

1. Please select the box that applied to your current situation.

- ☐ Currently teaching English as a Second Language
- ☐ Currently enrolled in a Teacher Education Program or TESL program
- ☐ Other, please specify... _____

2. Please select the level of learners that you are currently teaching, or that you intend to teach in the future.

- ☐ Primary (JK - G3) ☐ Junior (G4 - G6) ☐ Senior (G7 - G8)
☐ Secondary (G9 - G12) ☐ Adults ☐ Other ☐ N/A

3. Please provide your age. _____

4. Please specify your gender. ☐ Male ☐ Female

LANGUAGE LEARNING & TEACHING

A. Language Learning Experience

A. 1. Do you have any experience of learning second and/or foreign language(s)?

☐ Yes ☐ No

Language	Duration (year)	
		Country: ☐ Second language ☐ Foreign language ☐ Primary ☐ Secondary ☐ Post-secondary ☐ Home ☐ Other
		Country: ☐ Second language ☐ Foreign language ☐ Primary ☐ Secondary ☐ Post-secondary ☐ Home ☐ Other
		Country: ☐ Second language ☐ Foreign language ☐ Primary ☐ Secondary ☐ Post-secondary ☐ Home ☐ Other

B. Language Teaching Experience

B. 1. Do you have any experience of teaching second and/or foreign language(s)?

☐ Yes ☐ No

Language	Duration (year)	
		Country: ☐ Second language ☐ Foreign language ☐ Primary ☐ Secondary ☐ Post-secondary ☐ Home ☐ Other
		Country: ☐ Second language ☐ Foreign language ☐ Primary ☐ Secondary ☐ Post-secondary ☐ Home ☐ Other
		Country: ☐ Second language ☐ Foreign language ☐ Primary ☐ Secondary ☐ Post-secondary ☐ Home ☐ Other

EXPERIENCE USING DIGITAL TECHNOLOGY

A. Experience with digital technology as a language learner in the classroom

☐ I have never used digital technology.

I would like you to reflect on your language learning experience. Have you used digital technology while you were learning? If the answer is no, please check off the box below. If yes, please proceed to following questions.

A. 1. When you were learning language(s), how proficient were you in using digital technology?

- ☐ Unfamiliar --- I have no experience with digital technology.
- ☐ Newcomer --- I have attempted to use digital technology, but I still require help regularly.
- ☐ Beginner --- I can perform basic functions in a limited number of digital technology.
- ☐ Intermediate --- I demonstrate a general competency in a number of digital technology.
- ☐ Advanced --- I have acquired the ability to competently use a broad range of digital technology.
- ☐ Expert --- I am extremely proficient in using a wide variety of digital technology.

A. 2. When you were learning language(s), how often did you use digital technology for each purpose listed below?

Instructional (e.g. lectures, presentations)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Communicative (e.g. emailing, video-conferencing, online messaging/chatting, social networking)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Informative (e.g. using the internet – website search, reading online journal, etc.)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Organizational (e.g. record keeping, lesson plans)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Creative (e.g. painting/drawing, taking/editing photos/videos, writing)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Recreational (e.g. video games, educational games, music, movies)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Evaluative (e.g. tests, quizzes, assignments)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Expansive (e.g. simulations, experiments, exploratory environments, brainstorming)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never

A. 3. From the list below, please select ALL the types of digital technology that you have used for learning language(s) in the past.

- ☐ Computers and related devices (e.g. desktop, laptop, printer, scanner)
- ☐ Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- ☐ Interactive whiteboard
- ☐ Digital camera / camcorder
- ☐ Internet (e.g. searching and sharing information, online learning, communicating via emails, blogs, social networks, recording audio/video)
- ☐ Educational software and applications
- ☐ Other software (e.g. word processing, presentation, data management, webpage design/management)
- ☐ Other, please specify... _____

A. 4. From the list below, please select ALL the types of digital technology that you are currently using for learning language(s).

- ☐ Computers and related devices (e.g. desktop, laptop, printer, scanner)

- ☐ Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- ☐ Interactive whiteboard
- ☐ Digital camera / camcorder
- ☐ Internet (e.g. searching and sharing information, online learning, communicating via emails, blogs, social networks, recording audio/video)
- ☐ Educational software and applications
- ☐ Other software (e.g. word processing, presentation, data management, webpage design/management)
- ☐ Other, please specify... _____

B. Experience with digital technology as a language teacher in the classroom

I would like you to reflect on your language teaching experience. Have you used digital technology while you were teaching? If the answer is no, please check off the box below. If yes, please proceed to following questions.

- ☐ I have never used digital technology.

B. 1. When you were teaching language(s), how proficient were you in using digital technology?

- ☐ Unfamiliar --- I have no experience with digital technology.
- ☐ Newcomer --- I have attempted to use digital technology, but I still require help regularly.
- ☐ Beginner --- I can perform basic functions in a limited number of digital technology.
- ☐ Intermediate --- I demonstrate a general competency in a number of digital technology.
- ☐ Advanced --- I have acquired the ability to competently use a broad range of digital technology.
- ☐ Expert --- I am extremely proficient in using a wide variety of digital technology.

B. 2. When you were teaching language(s), how often did you use digital technology for each purpose listed below?

Instructional (e.g. lectures, presentations)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Communicative (e.g. emailing, video-conferencing, online messaging/chatting, social networking)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Informative (e.g. using the internet – website search, reading online journal, etc.)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Organizational (e.g. record keeping, lesson plans)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Creative (e.g. painting/drawing, taking/editing photos/videos, writing)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Recreational (e.g. video games, educational games, music, movies)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Evaluative (e.g. tests, quizzes, assignments)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Expansive (e.g. simulations, experiments, exploratory environments, brainstorming)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never

B. 3. From the list below, please select ALL the types of digital technology that you have used for teaching language(s) in the past.

- ☐ Computers and related devices (e.g. desktop, laptop, printer, scanner)
- ☐ Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- ☐ Interactive whiteboard
- ☐ Digital camera / camcorder
- ☐ Internet (e.g. searching and sharing information, online learning, communicating via emails, blogs, social networks, recording audio/video)
- ☐ Educational software and applications
- ☐ Other software (e.g. word processing, presentation, data management, webpage design/management)
- ☐ Other, please specify... _____

B. 4. From the list below, please select ALL the types of digital technology that you are currently using for teaching language(s).

- ☐ Computers and related devices (e.g. desktop, laptop, printer, scanner)
- ☐ Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- ☐ Interactive whiteboard
- ☐ Digital camera / camcorder
- ☐ Internet (e.g. searching and sharing information, online learning, communicating via emails, blogs, social networks, recording audio/video)
- ☐ Educational software and applications
- ☐ Other software (e.g. word processing, presentation, data management, webpage design/management)
- ☐ Other, please specify... _____

C. Experience with digital technology in your personal life.

I would like you to reflect on your personal experience. Do you use digital technology for your personal purposes such as communicating with your friends and family? If the answer is no, please check off the box below. If yes, please proceed to following questions.

- ☐ I do not use digital technology.

C. 1. When you use digital technology for your personal purposes, how proficient are you?

- ☐ Unfamiliar --- I have no experience with digital technology.
- ☐ Newcomer --- I have attempted to use digital technology, but I still require help regularly.
- ☐ Beginner --- I can perform basic functions in a limited number of digital technology.
- ☐ Intermediate --- I demonstrate a general competency in a number of digital technology.
- ☐ Advanced --- I have acquired the ability to competently use a broad range of digital technology.
- ☐ Expert --- I am extremely proficient in using a wide variety of digital technology.

C. 2. How often do you use digital technology personally for each purpose listed below?

Communicative (e.g. emailing, video-conferencing, online messaging/chatting, social networking)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Informative (e.g. using the internet – website search, reading online journal, etc.)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Organizational (e.g. record keeping, budgeting, agenda)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Creative (e.g. painting/drawing, taking/editing photos/videos, writing)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Recreational (e.g. video games, educational games, music, movies)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never
Expansive (e.g. simulations, experiments, exploratory environments, brainstorming)	☐ daily ☐ weekly ☐ monthly ☐ rarely ☐ never

C. 3. From the list below, please select ALL the types of digital technology that you have used for personal purposes.

- ☐ Computers and related devices (e.g. desktop, laptop, printer, scanner)
- ☐ Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- ☐ Interactive whiteboard
- ☐ Digital camera / camcorder
- ☐ Internet (e.g. searching and sharing information, online learning, communicating via emails, blogs, social networks, recording audio/video)
- ☐ Educational software and applications
- ☐ Other software (e.g. word processing, presentation, data management, webpage design/management)
- ☐ Other, please specify... _____

C. 4. From the list below, please select ALL the types of digital technology that you are currently using for personal purposes.

- ☐ Computers and related devices (e.g. desktop, laptop, printer, scanner)
- ☐ Mobile devices (e.g. tablet PC, iPad, iPod, smartphone)
- ☐ Interactive whiteboard
- ☐ Digital camera / camcorder

- ☐ Internet (e.g. searching and sharing information, online learning, communicating via emails, blogs, social networks, recording audio/video)
- ☐ Educational software and applications
- ☐ Other software (e.g. word processing, presentation, data management, webpage design/management)
- ☐ Other, please specify... _____

D. Experience of learning how to use digital technology

D. 1. Have you ever learned how to use digital technology in the classroom such as workshop, conference, or formal course?

☐ Yes ☐ No

D. 2. If yes, where, how long, and for what purpose have you participated in such training? Please provide the information below.

Type of institution	Duration (week / month)	Purpose
☐ Secondary ☐ Post-secondary ☐ Private ☐ Self ☐ Other		☐ Personal interest ☐ Professional development ☐ Course requirement ☐ Other
☐ Secondary ☐ Post-secondary ☐ Private ☐ Self ☐ Other		☐ Personal interest ☐ Professional development ☐ Course requirement ☐ Other
☐ Secondary ☐ Post-secondary ☐ Private ☐ Self ☐ Other		☐ Personal interest ☐ Professional development ☐ Course requirement ☐ Other

OPEN-ENDED PROMPTS

From the perspective of a teacher, Please provide brief response (2-3 sentences) to each of the prompts below.

1. Describe your actual use of digital technology in your classroom
2. Describe how you view the ideal use of digital technology in your classroom.

BELIEFS STATEMENTS

Please indicate how strongly you agree or disagree with each of the following statements. Please identify your answer on the scale to the right of each statement, where 1 = STRONGLY DISAGREE and 5 = STRONGLY AGREE.

Example.

This answer means you agree with the statement.

Statement	Scale	
	STRONGLY	STRONGLY
I like to use digital technology.	DISAGREE	AGREE
	1 2 3 4 5	

Statements	Scale				
	1	2	3	4	5
I find digital technology useful in enhancing my performance as a teacher in the classroom.	☐	☐	☐	☐	☐
I find digital technology useful in improving my students' language skills (i.e. reading, writing, listening, and speaking) when I teach.	☐	☐	☐	☐	☐
I provide my students with opportunities to use digital technology.	☐	☐	☐	☐	☐
As a teacher, I am enthusiastic about using digital	☐	☐	☐	☐	☐

technology in the classroom.					
I would describe myself as an early adaptor of digital technology compared to my fellow teachers.	☐	☐	☐	☐	☐
I can use digital technology to collect information from a variety of resources.	☐	☐	☐	☐	☐
I can use digital technology to facilitate academic learning.	☐	☐	☐	☐	☐
When I use digital technology in the classroom, I understand clearly how to use it.	☐	☐	☐	☐	☐
I can troubleshoot common problems when using digital technology.	☐	☐	☐	☐	☐
I can choose digital technology based on its appropriateness to specific tasks in the classroom.	☐	☐	☐	☐	☐
I can use digital technology to communicate with students.	☐	☐	☐	☐	☐
When I use digital technology in the classroom, I need help from other staff.	☐	☐	☐	☐	☐
I am confident in using all kinds of digital technology available in my classroom.	☐	☐	☐	☐	☐
I have access to digital technology in my classroom.	☐	☐	☐	☐	☐
I am satisfied with technical infrastructure in my school (e.g. internet connection, digital technology equipment).	☐	☐	☐	☐	☐
I am satisfied with resources available in my school regarding the use of digital technology in learning and teaching language.	☐	☐	☐	☐	☐
I am encouraged to attend in educational programs regarding digital technology.	☐	☐	☐	☐	☐
Students are encouraged to use digital technology in the school.	☐	☐	☐	☐	☐
I feel it is important for students to be enthusiastic	☐	☐	☐	☐	☐

about using digital technology in the classroom.					
I feel it is important for students to actively participate in activities using digital technology.	☐	☐	☐	☐	☐
The teachers and staff in my school are enthusiastic about using digital technology.	☐	☐	☐	☐	☐
The teachers and staff in my school are encouraged to use digital technology.	☐	☐	☐	☐	☐
I am willing to make digital technology regular feature in my teaching.	☐	☐	☐	☐	☐
The use of digital technology in the classroom limits my abilities as a teacher.	☐	☐	☐	☐	☐
I am willing to learn more about digital technology.	☐	☐	☐	☐	☐
The teachers and staff in my school actively use digital technology.	☐	☐	☐	☐	☐
I feel that it is important to use digital technology in the classroom.	☐	☐	☐	☐	☐
I feel that the use of digital technology interrupts the normal classroom activities.	☐	☐	☐	☐	☐
The use of digital technology makes lessons enjoyable for my students.	☐	☐	☐	☐	☐
The use of digital technology lets my students have fun in the classroom.	☐	☐	☐	☐	☐
I feel that digital technology is beneficial in motivating my students to participate in the classroom activities.	☐	☐	☐	☐	☐

CLOSING STATEMENT

Thank you very much for taking the time to complete this survey. Please note that once the survey is submitted, it will not be possible to withdraw from this survey.

If you wish to participate in a short post-survey interview, please provide your name and contact information (email address and phone number) below and the researcher will contact you shortly. You will be presented with a gift card (value \$10) as a token of the appreciation for your participation in the interview.

Would you like to participate in a post-survey interview?

☐ Yes ☐ No

Thank you for volunteering. Please provide your name, email address, and phone number.

Name _____

Email _____

Phone _____

Appendix B. Interview consent form

Interview consent form

Date of ethics clearance: December 4, 2013

Ethics Clearance for the Collection of Data Expires: May 31, 2014

I _____, choose to participate in the study of the ESL teachers' beliefs about the use of digital technology in the classroom. The researcher for this study is Seunghye Chung in the department of Applied Linguistics and Discourse Studies at Carleton University. She is working under the supervision of Professor Eva Kartchava in the department of Applied Linguistics and Discourse Studies at Carleton University.

This study involves one 15 - 20 minute interview. With your consent, the interview will be audio-recorded.

I will take precautions to protect your identity. This will be done by keeping all responses anonymous and allowing you to request that certain responses not be included in the final project. Should you experience any distress during the interview, you will be provided with contact information for counseling services available nearby.

You have the right to end your participation in the study at any time, for any reason. You can withdraw by calling or emailing me, or my supervisor. If you withdraw from the study, all information you have provided will be immediately destroyed.

As a token of appreciation, you will receive a \$10 gift card. This is yours to keep, even if you withdraw from the study.

The audio-recordings and transcripts of this interview will be encrypted and password-protected on the external hard drive and will be locked in a cabinet at Carleton University where my supervisor and I can only access.

Once the project is completed, all research data will be kept for five years and potentially used for other research projects on the same or relating topic. At the end of five years, all research data will be securely destroyed.

If you would like a copy of the finished research project, please contact my supervisor or me.

This project was reviewed by the Carleton University Research Ethics Board, which provided clearance to carry out the research. Should you have questions or concerns related to your involvement in this research, please contact:

REB contact information:

Professor Andy Adler, Chair,

Professor Louise Heslop, Vice-Chair

Research Ethics Board, Carleton University

1325 Duntton Tower, 1125 Colonel By Drive, Ottawa, ON K1S 5B6

Tel: 613-520-2517

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Researcher contact information:
Seunghye Chung
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Supervisor contact information:
Eva Kartchava
Applied Linguistics and Discourse Studies
Carleton University
Tel: 613-520-2600 x 3932
Email: eva.kartchava@carleton.ca

Active Consent

I have read and understood the request to participate in an interview conducted as part of the study on the ESL teachers' beliefs about the use of digital technology in the classroom and ...

- ☐ I consent to participate in the post-survey interview and to be audio-recorded during the interview.
☐ I do not consent to participate in the post-survey interview.

Signature of participant

Date

Signature of researcher

Date

Appendix C. Guiding questions for post-survey interview

1. Have you ever used any kind of digital technology in your classroom? Could you describe how you used it/them?
 - 1-1. Was it easy or difficult for you to use it? What is the reason?
 - 1-2. If difficult, Could you describe when you had such difficulties?
 - 1-2-1. Did you find a solution for the difficulty(s)?
 - 1-2-2. Did you seek help from other staff(s)?
2. Thinking about your teaching, could you describe an experience when you found digital technology was useful? Why do you think it was useful?
 - 2-1. Were there cases when it was not useful? Why do you think it was not useful?
3. Do you think your students appear to enjoy the lessons by using digital technology?
 - 3-1. Could you please explain the reason if yes?
 - 3-2. Could you please explain the reason if not?
4. Do you feel you need more support from your school to help you use digital technology in your classroom? For example, providing technical support, resources (books, or software availability), training opportunities, etc.
 - 4-1. If yes, in which area do you feel you need to have support the most?
 - 4-2. What is the reason?
5. Do you feel you need to take courses to help you use digital technology in your classroom?
 - 5-1. If yes, in which area do you need the training the most?
6. Besides the answers you have given above, would you like to add any comment?

Appendix D. Normal distribution of 4 beliefs factors

Appendix E. Bax's (2003) definition of CALL approaches (p. 21)

	Restricted CALL	Open CALL	Integrated CALL
Content	Language system	System and skills	Integrated language skills work / Mixed skills and system
Task	Closed drills / Quizzes	<ul style="list-style-type: none"> - Simulations - Games - Computer-mediated communication (CMC) 	Computer-mediated communication (CMC) WP E-mail Any, as appropriate to the immediate needs
Student activity	<ul style="list-style-type: none"> - Text reconstruction - Answering closed questions - Minimal interaction with other students 	<ul style="list-style-type: none"> - Interacting with the computer - Occasional interaction with other students 	Frequent interaction with other students Some interaction with computer through the lesson
Feedback	Correct/incorrect	<ul style="list-style-type: none"> - Focus of linguistic skills developments - Open - Flexible 	Interpreting, evaluating, commenting, stimulating thought
Teacher roles	Monitor	Monitor / facilitator	Facilitator / Manager
Teacher attitudes	Exaggerated fear and/or awe	Exaggerated fear and/or awe	Normal part of teaching – Normalized
Position in curriculum	Not integrated into syllabus – optional extra	Toy Not integrated into syllabus – optional extra Technology precedes syllabus and learner needs	Tool for learning Normalized integrated into syllabus, adapted to learners' needs Analysis of needs and context precedes decisions about technology
Position in lesson	Whole CALL lesson	Whole CALL lesson	Smaller part of every lesson
Physical position of computer	Separate computer lab	Separate computer lab – perhaps devoted to languages	In every classroom, On every desk, In every bag

Appendix F. Letter of ethics clearance

Carleton University Research Office
Research Ethics Board
1325 Duntton Tower
1125 Colonel By Drive
Ottawa, ON K1S 5B6 Canada
Tel: 613-520-2517
ethics@carleton.ca

Ethics Clearance Form

This is to certify that the Carleton University Research Ethics Board has examined the application for ethical clearance. The REB found the research project to meet appropriate ethical standards as outlined in the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*, 2nd edition and, the *Carleton University Policies and Procedures for the Ethical Conduct of Research*.

☒ **New clearance**

☐ **Renewal of original clearance**

Original date of clearance:

Date of clearance	4 December 2013
Researcher	Seunghye Chung, Master's student
Department	School of Linguistics and Language Studies
Supervisor	Prof. Eva Kartchava, School of Linguistics and Language Studies
Project number	100714
Title of project	Pre-service and in-service elementary ESL teachers' beliefs about the use of digital technology in the classroom

Clearance expires: **31 May 2014**

All researchers are governed by the following conditions:

Annual Status Report: You are required to submit an Annual Status Report to either renew clearance or close the file. Failure to submit the Annual Status Report will result in the immediate suspension of the project. Funded projects will have accounts suspended until the report is submitted and approved.

Changes to the project: Any changes to the project must be submitted to the Carleton University Research Ethics Board for approval. All changes must be approved prior to the continuance of the research.

Adverse events: Should any participant suffer adversely from their participation in the project you are required to report the matter to the Carleton University Research Ethics Board. You must submit a written record of the event and indicate what steps you have taken to resolve the situation.

Suspension or termination of clearance: Failure to conduct the research in accordance with the principles of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*, 2nd edition and the *Carleton University Policies and Procedures for the Ethical Conduct of Research* may result in the suspension or termination of the research project.

Andy Adler, Chair
Carleton University Research Ethics Board

Louise Heslop, Vice-Chair
Carleton University Research Ethics Board

References

- Almekhlafi, A., & Almeqdadi, F. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Educational Technology & Society*, 13(1), 165-175.
- An, Y., & Reigeluth, C. (2011-12). Creating technology-enhanced, learner-centered classrooms: K-12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education*, 28(2), 54-62.
- Andres, L. (2012). *Designing & Doing Survey Research*. Thousand Oaks, CA: SAGE.
- Angeli, C., & Valanides, N. (2005). Preservice elementary teachers as information and communication technology designers: an instructional systems design model based on an expanded view of pedagogical content knowledge. *Journal of Computer Assisted Learning*, 21(4), 292-302.
- Arnold, N. (2007). Technology-mediated learning 10 years later: Emphasizing pedagogical or utilitarian applications? *Foreign Language Annals*, 40(1), 161-181.
- Ashton, P. T. (1990). Editorial. *Journal of Teacher Education*, 41(1).
- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bauer, J., & Kenton, J. (2005). Toward technology integration in the schools: why it isn't happening. *Journal of Technology and Teacher Education*, 13(4), 519-546.
- Bax, S. (2003). CALL – past, present, and future. *System*, 31, 13-28.
- Bensiger, J. (2011). *Perception of Pre-service Teachers of Using Video Games as Teaching Tools*. Retrieved from ProQuest Digital Dissertations. (AAT 3517303).

- Bernat, E., & Gvozdenko, I. (2005). Beliefs about language learning: Current knowledge, pedagogical implications, and new research directions. *TESL-EJ*, 9, 1-21.
- Borg, S. (1999). Studying teacher cognition in second language grammar teaching. *System*, 27, 19-31.
- Borg, S. (2003). Teacher cognition in language teaching: a review of research on what language teachers think, know, believe, and do. *Language Teaching*, 36, 81-109.
- Borg, S. (2006). *Teacher Cognition and Language Education: Research and Practice*. New York, NY: Continuum.
- Bourgonjon, J., Valcke, M., Soetaert, R., & Schellens, T. (2010). Video games in the classroom opinion survey [Databased record]. Retrieved from PsycTESTS. doi: 10.1037/t14133-000
- Breen, M. P. (1991). Understanding the language teacher. In R. Phillipson, E. Kellerman, L. Selinker, M. Sharwood Smith, & M. Swain (Eds.), *Foreign/Second Language Pedagogy Research: A Commemorative Volume for Claus Færch*. Bristol, PA: Multilingual Matters Ltd.
- Brown, J. D., & Rodgers, T. S. (2002). *Doing Second Language Research*. Oxford, UK: Oxford University Press.
- Brown, D., & Warschauer, M. (2006). From the university to the elementary classroom: Students' experiences in learning to integrate technology in instruction. *Journal of Technology and Teacher Education*, 14(3), 599-621.
- Bruess, L. (2003). *University ESL Instructors' Perceptions and Use of Computer Technology in Teaching*. Retrieved from ProQuest Digital Dissertations. (AAT 3092896).

- Brush, T., Glazewski, K. D., & Hew, K. F. (2008). Development of an instrument to measure preservice teachers' technology skills, technology beliefs, and technology barriers. *Computers in the Schools*, 25(1-2), 112-125.
- Bush, M. D., & Terry, R. M. (Eds.). (1997). *Technology-Enhanced Language Learning*. Loncolnwood, IL: National Textbook Company.
- Calderhead, J. (1991). The nature and growth of knowledge in student teaching. *Teaching and Teacher Education*, 5, 43-51.
- Caracelli, V. J., & Greene, J. C. (1993). Data analysis strategies for mixed-method evaluation design. *Educational Evaluation and Policy Analysis*, 15(2), 195-207.
- Chai, C. S., Koh, J., Tsai, C., & Tan, L. (2011). Modeling primary school pre-service teachers' technological pedagogical content knowledge (TPACK) for meaningful learning with information and communication technology (ICT). *Computers & Education*, 57, 1184-1193.
- Christensen, R., & Knezek, G. (2000). Internal consistency reliabilities for 14 computer attitude scales. *Journal of Technology and Teacher Education*, 8(4), 327-336.
- Clark, C. M., & Peterson, P. L. (1986). Teachers' thought processes. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching*. New York, NY: Macmillan.
- Connelly, F. M., & Clandinin, D. J. (1988). *Teachers as Curriculum Planners, Narratives of Experience*. New York, NY: Teachers College Press.
- Cuttrim-Schimid, E., & Whyte, S. (2012). Interactive whiteboards in state school settings: Teacher responses to socio-constructivist hegemonies. *Language Learning & Technology*, 16(2), 65-86.
- Davies, G. (1982). *Computers, Language and Language Learning*. London, UK: CILT.

- Davis, F., Bagozzi, R., & Warshaw, P. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- Debevec, K., Shih, M., & Kashyap, V. (2006). Learning strategies and performance in a technology integrated classroom. *Journal of Research on Technology in Education*, 38(3), 293-307.
- De Groot, E. (2002). Learning through interviewing: Students and teachers talk about learning and schooling. *Educational Psychologist*, 37, 41-52.
- Douglas, S. R. (2014). Teacher perceptions of task-based language teaching and learning across Canada. In H.M. McGarrell & D. Wood (eds.) *Contact – Refereed Proceedings of TESL Ontario Research Symposium*, 40, 2. Retrieved from <http://www.teslontario.net/publication/research-symposium>
- Dörnyei, Z. (2003). *Questionnaire in Second Language Research: Construction, Administration, and Processing*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Dörnyei, Z. (2007). *Research Methods in Applied Linguistics*. Oxford, UK: Oxford University Press.
- DuBravac, S. (2013). *Technology in the L2 Curriculum*. Boston, MA: Pearson Education Inc.
- Ebsworth, M. E., Kim, A. J., & Klein, T. (2010). Projections: From a graduate TELL class to the practical world of L2 teachers. *CALICO Journal*, 27(2), 349-375.
- Ertmer, P. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *ETR & D*, 47(4), 47-61.
- Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *ETR & D*, 53(4), 25-39.

- Fang, Z. (1995). On paradigm shift in reading/literacy research. *Reading Psychology*, 16(2), 215-260.
- Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, 38(1), 47-65.
- Feng, Y. (2012). *English Language Teachers' Perceptions of Computer-Assisted Language Learning*. Retrieved from ProQuest Digital Dissertations. (AAT 3549718).
- Fook, C., Sidhu, G., Kamar, N., & Aziz, N. (2011). Pre-service teachers' training in information communication and technology for the ESL classrooms in Malaysia. *Turkish Online Journal of Distance Education-TOJDE*, 11(3), 97-108.
- Fotos, S., & Browne, C. (2004). The development of CALL and current options. In S. Fotos, & C. Browne (Eds.), *New Perspectives on CALL for Second Language Classroom*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Fullan, M. (1983). Research into educational innovation. In H. L. Gray (Ed.), *The Management of Educational Institutions*. Lewes, UK: The Falmer Press.
- Garret, N. (2009). Computer-assisted language learning trends and issues revisited: Integrating innovation. *The Modern Language Journal*, 93 (Focus), 719-740.
- Gee, J. P. (2003). *What Video Games Have to Teach Us about Learning and Literacy*. New York, NY: Palgrave Macmillan.
- Gérard, F., & Widener, J. (1999). A SMARTer way to teach foreign language: The SMART board interactive whiteboard as a language learning tool. Retrieved from http://downloads01.smarttech.com/media/research/international_research/usa/sbforeignlanguageclass.pdf

- Goodman, J. (1988). Constructing a practical philosophy of teaching: A study of preservice teachers' professional perspectives. *Teaching & Teacher Education*, 4, 121-137.
- Gosling, S. D., Srivastava, S., Pand, O., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires. *American Psychologist*, 59, 93-104.
- Gromik, N. (2012). Cell phone video recording feature as a language learning tool: A case study. *Computers & Education*, 58, 223-230.
- Hayes, E., & Ohrnberger, M. (2013). The gamer generation teaches school: The gaming practices and attitudes towards technology of pre-service teachers. *Journal of Technology and Teacher Education*, 21(2), 153-177.
- Hermans, R., Tondeur, J., Van Braack, J., & Valcke, M. (2008). The impact of primary school teachers' educational beliefs on the classroom use of computers. *Computers & Education*, 51, 1499-1509.
- Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Education Tech Research Dev*, 55, 223-252.
- Horwitz, E. K. (1985). Using student beliefs about language learning and teaching in the foreign language methods course. *Foreign Language Annals*, 18(4), 333-340.
- Horwitz, E. K. (1988). The beliefs about language learning of beginning university foreign language students. *The Modern Language Journal*, 72(3), 283-294.
- Hubbard, P. (2008). CALL and the future of language teacher education. *CALICO Journal*, 25(2), 175-188.

- Hubbard, P. (2013). Making a case of learner training in technology enhanced language learning environments. *CALICO Journal*, 30(2), 163-178.
- Hur, J., & Suh, S. (2012). Making learning active with interactive whiteboards, podcasts, and digital storytelling in ELL classrooms. *Computers in the Schools*, 29, 320-338.
- Inan, F. A., & Lowther, D. L. (2010). Laptops in the K-12 classrooms: Exploring factors impacting instructional use. *Computers & Education*, 55, 937-944.
- Jenson, J., Taylor, N., & Fisher, S. (2011). *Critical Review and Analysis of the Issue of "Skills, Technology and Learning"*. Retrieved from http://www.edu.gov.on.ca/eng/research/jenson_reporteng.pdf
- Johnson, K. E. (1992). The relationship between teachers' beliefs and practices during literacy instruction for non-native speakers of English. *Journal of Reading Behavior*, 24(1), 83-108.
- Johnson, K. E. (1994). The emerging beliefs and instructional practices of preservice English as a Second Language teachers. *Teaching & Teacher Education*, 10(4), 439-452.
- Jones, N. T. (2013) *Veteran Teachers' Perceptions of the Factors Influencing the Incorporation of Advanced Technology into Their Classrooms*. Retrieved from ProQuest Digital Dissertations. (AAT 3572672).
- Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education*, 14(3), 581-597.

- Junqueira, L., & Kim, Y. (2013). Exploring the relationship between training, beliefs, and teachers' corrective feedback practices: A case study of a novice and an experienced ESL teacher. *The Canadian Modern Language Review/La revue Canadienne des langues vivantes*, 69(2), 181-206.
- Kagan, D. M. (1990). Ways of evaluating teacher cognition: Inferences concerning the Goldilocks principle. *Review of Educational Research*, 60, 419-169.
- Kagan, D. M. (1992). Implications of research on teacher beliefs. *Educational Psychologist*, 27, 65-90.
- Karagiorgi, Y. (2005). Throwing light into the black box of implementation: ICT in Cyprus elementary schools. *Educational Media International*, 42(1), 19–32.
- Kartchava, E., & Ammar, A. (2013). Learners' beliefs as mediators of what is noticed and learned in the language classroom. *TESOL Quarterly*, 48(1), 86-109.
- Kern, R. (2006). Perspectives on technology in learning and teaching languages. *TESOL Quarterly*, 40(1), 183-210.
- Kessler, G. (2006). Assessing CALL teacher training: What are we doing and what could we do better? In P. Hubbard, & M. Levy (Eds.), *Teacher Education in CALL* (pp. 23-42). Amsterdam, Netherlands: John Benjamins.
- Kessler, G., & Plakans, L. (2008). Does teachers' confidence with CALL equal innovative and integrated use? *Computer Assisted Language Learning*, 21(3), 269-282.
- Kim, H. K. (2008). Beyond motivation: ESL/EFL teachers' perceptions of the role of computers. *CALICO Journal*, 25(2), 241-259.

- Kong, S., & Li, K. (2009). Collaboration between school and parents to foster information literacy: Learning in the information society. *Computers & Education*, 52, 275-282.
- Knezek, G., & Christensen, R. (1998). Internal consistency reliability for the teachers' attitudes toward information technology questionnaire. Paper presented at the Society of Information Technology & Teacher Education (SITE)'s 9th International Conference, Washington, DC.
- Lam, Y. (2000). Technophilia vs. technophobia: A preliminary look at why second language teachers do or do not use technology in their classrooms. *The Canadian Modern Language Review/La revue Canadienne des langues vivantes*, 56(3), 389-420.
- Lawrence, G., Haque, E., & King, J. (2013). *Rationale and recommendations for implementing e-learning in Ontario non-credit adult ESL programs: A feasibility report*. Toronto, Canada: The Toronto Catholic District School Board.
- Lawrence, G. (2014). A call for the human feel in today's increasingly blended world. In H.M. McGarrell & D. Wood (eds.) *Contact – Refereed Proceedings of TESL Ontario Research Symposium*, 40, 2. Retrieved from <http://www.teslontario.net/publication/research-symposium>
- Lei, J., & Zhao, Y. (2007). Technology uses and student achievement: A longitudinal study. *Computers & Education*, 49, 284-296.
- Levy, M. (2012). Technology in the classroom. In A. Burns & J. C. Richards (Eds.), *The Cambridge Guide to Pedagogy and Practice in Second Language Teaching*. Cambridge, U.K.: Cambridge University Press.

- Li, G., & Ni, Y. (2011). Primary EFL teachers' technology use in China: Patterns and perceptions. *RELC Journal*, 42(1), 69-85.
- Lightbown, P. M., & Spada, N. (1993). *How Languages are Learned*. Oxford, UK: Oxford University Press.
- Lortie, D. C. (1975). *School-Teacher: A Sociological Study*. Chicago, IL: The University of Chicago Press.
- Loewen, S., Li, S., Fei, F., Thompson, A., Nakatsukasa, K., Ahn, S., & Chen, X. (2009). Second language learners' beliefs about grammar instruction and error correction. *The Modern Language Journal*, 93(1), 91-104.
- Markee, N. (1993). The diffusion of innovation in language teaching. *Annual Review of Applied Linguistics*, 13, 229-243.
- Milton, P. (2003). *Trends in the Integration of ICT and Learning in K-12 Systems*. Retrieved from <http://www.cea-ace.ca/publication/trends-integration-ict-and-learning-k-12-systems>
- Muir-Herzig, R. (2004). Technology and its impact in the classroom. *Computers & Education*, 42, 111-131.
- Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies*, 19(4), 317-328.
- Newhouse, C. P. (2001). A follow-up study of students using portable computers at a secondary school. *British Journal of Educational Technology*, 32(2), 209-219.
- Nisbett, R., & Ross, L. (1980). *Human Inference: Strategies and Shortcomings of Social Judgment*. Englewood Cliffs, NJ: Prentice-Hall.

- Nishino, T. (2012). Modeling teacher beliefs and practices in context: A multimethods approach. *The Modern Language Journal*, 96(3), 380-399.
- Pajares, M. F. (1992). Teachers' beliefs and educational research: cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Pallant, J. (2011). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using the SPSS Program* (4th ed.). Crows Nest, N.S.W., Australia: Allen & Unwin.
- Parks, S., Huot, D., Hamers, J., & Lemonnier, F. (2003). Crossing boundaries: Multimedia technology and pedagogical innovation in a high school class. *Language Learning & Technology*, 7(1), 28-45.
- Peacock, M. (2001). Pre-service ESL teachers' beliefs about second language learning: A longitudinal study. *System*, 29(2), 177-195.
- People for Education. (2008). *Language Support for Newcomer Students: From The Annual Report on Ontario's Public Schools*. Retrieved from <http://www.peopleforeducation.ca/wp-content/uploads/2011/07/Language-Support-for-Newcomers-2008.pdf>
- Peterson, M. (2010). Computerized games and simulations in computer-assisted language learning: A meta-analysis of research. *Simulation & Gaming*, 41(1), 72-93.
- Phipps, S., & Borg, S. (2009). Exploring tensions between teachers' grammar teaching beliefs and practices. *System*, 37, 380-390.
- Prestridge, S. (2012). The beliefs behind the teacher that influences their ICT practices. *Computers & Education*, 58, 449-458.
- Putnam, R. T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning. *Educational Researcher*, 29(1), 4-15.

- Rea, L. M. & Parker, R. A. (1992). *Designing and Conducting Survey Research: A Comprehensive Guide* (3rd ed.). San Francisco, CA: Jossey-Bass Publishers.
- Reinders, H. (2012). Online and blended instruction. In A. Burns & J. C. Richards (Eds.), *The Cambridge Guide to Pedagogy and Practice in Second Language Teaching*. Cambridge, U.K.: Cambridge University Press.
- Richards, J. C. (2012). Competence and performance in language teaching. In A. Burns & J. C. Richards (Eds.), *The Cambridge Guide to Pedagogy and Practice in Second Language Teaching*. Cambridge, U.K.: Cambridge University Press.
- Robin, B. R. & Harris, J. B. (1998). Correlates among computer-using teacher educators' beliefs, teaching and learning preferences, and demographics. *Journal of Educational Computing Research*, 18 (1), 15-35.
- Rokeach, M. (1968). *Beliefs, Attitudes, and Values: A Theory of Organization and Change*. San Francisco, CA: Jossey-Bass Inc.
- Rogers, E. (1995). *Diffusion of Innovations*. (4th ed.) New York, NY: Free Press.
- Rother, C. (2005). Teachers talk tech. *T.H.E. Journal*, 32(3). Retrieved from thejournal.com/Articles/2005/10/01/Teachers-Talk-Tech.aspx
- Salaberry, M. R. (2001). The use of technology for second language learning and teaching: A retrospective. *The Modern Language Journal*, 85, 39-56.
- Sakui, K., & Gaies, S. J. (1999). Investigating Japanese learners' beliefs about language learning. *System*, 27, 473-492.
- Sato, M. (2013). Beliefs about peer interaction and peer corrective feedback: Efficacy of classroom intervention. *The Modern Language Journal*, 97(3), 611-633.

- Schulz, R. A. (1996). Focus on form in the foreign language classroom: students' and teachers' views on error correction and the role of grammar. *Foreign Language Annals*, 29(3), 343-364.
- Schulz, R. A. (2001). Cultural differences in student and teacher perceptions concerning the role of grammar instruction and corrective feedback: USA – Colombia. *The Modern Language Journal*, 85(2), 244-258.
- Sharp, R., & Green, A. (1975). *Education and Social Control*. London, UK: Routledge & Kegan Paul.
- Shattuck, D., Corbell, K., Osbourne, J., Knezek, G., Christensen, R., & Grable, L. (2011). Measuring teacher attitudes toward instructional technology: A confirmatory factor analysis of the TAC and TAT. *Computers in the Schools*, 28, 291-315.
- Shields, C., Telfer, S., & Bernard, J. (2012). *A Shifting Landscape: Pedagogy, Technology, and the New Terrain of Innovation in a Digital World - A Pilot Study of Local Innovation in Participating School Boards, Final Report*. Retrieved from Ontario Ministry of Education, http://www.edu.gov.on.ca/eng/research/Shifting_LandscapeE.pdf
- Shin, H., & Son, J. (2007). EFL teachers' perceptions and perspectives on Internet-assisted language teaching. *CALL-EJ Online*, 8(2). Retrieved from http://www.tell.is.ritsumei.ac.jp/callejonline/journal/8-2/h-js_j-bs.html
- Shinde, M., & Karekatti, T. (2012). Pre-service teachers' beliefs about teaching English to primary school children. *International Journal of Instruction*, 5(1), 69-86.
- Shulman, L. S. (1986). Those who understand: knowledge growth in teaching. *Educational Researcher*, 15, 4-14.

Shulman, L. S. (1987). Knowledge and teaching: Foundations for the new reform.

Harvard Education Review, 57(2), 4-14.

Smerdon, B., Cronen, S., Lanahan, L., Anderson, J., Iannotti, N., & Angeles, J. (2000).

Teachers' tools for the 21st century: A report on teachers' use of technology.

Washington, D.C.: National Center for Education Statistics, U.S. Department of Education.

Statistics Canada. (2013). *Canadian Internet Use Survey*. Retrieved from

<http://www.statcan.gc.ca/daily-quotidien/131126/dq131126d-eng.pdf>

Tabachnick, B. R., & Zeicher, K. M. (1984). The impact of the student teaching

experience on the development of teacher perspectives. *Journal of Teacher Education*, 35(6), 28-36.

Toland, C. (2010). *A Comparative Research Study on the Effects of Technology on*

Student Achievement in Teaching English to Students of Other Languages.

Retrieved from ProQuest Digital Dissertations. (AAT 3447106).

Tomlinson, B. (2012). Materials development. In A. Burns & J. C. Richards (Eds.), *The*

Cambridge Guide to Pedagogy and Practice in Second Language Teaching.

Cambridge, U.K.: Cambridge University Press.

Tsui, A. (2003). *Understanding Expertise in Teaching*. New York, NY: Cambridge

University Press.

Tsui, A. (2005). Expertise in teaching: Perspectives and issues. In K. Johnson (Ed.),

Expertise in Second Language Learning and Teaching. New York, NY: Palgrave

MacMillan.

- Van Braak, J., Tondeur, J., & Valcke, M. (2004). Explaining different types of computer use among primary school teachers. *European Journal of Psychology of Education, 19*(4), 407-422.
- Van Olphen, M. (2007). Perspectives of foreign language preservice teachers on the use of a web-based instructional environment in a methods course. *CALICO Journal, 25*(1), 91-109.
- Van Orden, S. (2010). *Integrating Digital Technologies in the German Language Classroom: A Critical Study of the Technology – Integration Experiences of Three Secondary German Teachers*. Retrieved From ProQuest Digital Dissertations. (AAT 3428207).
- Warschauer, M. (2000). The death of cyberspace and the rebirth of CALL. *English Teachers' Journal, 53*, 61-67.
- Warschauer, M. (2004). Technological change and the future of CALL. In S. Fotos, & C. Browne (Eds.), *New Perspectives on CALL for Second Language Classroom*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Warschauer, M. (2009). Learning to write in the laptop classroom. *Writing & Pedagogy, 1*(1), 101-112.
- Wilson, R., & Dewaele, J. (2010). The use of web questionnaires in second language acquisition and bilingual research. *Second Language Research, 26*(1), 103-123.
- Woods, D. (1996) *Teacher Cognition in Language Teaching: Beliefs, Decision-making and Classroom Practice*. Cambridge, UK: Cambridge University Press.

- Woolard, J. (2012). *Behind the Scenes: Understanding Teacher Perspectives on Technology Integration in a Suburban District Technology Initiative*. Retrieved from ProQuest Digital Dissertations. (AAT 3503892).
- Wozney, L., Venkatesh, V., & Abrami, P. (2006). Implementing computer technology: Teachers' perceptions and practices. *Journal of Technology and Teacher Education*, 14(1), 173-207.
- Young, J. R. (2010). Reaching the last technology holdouts at the front of the class. *The Chronicles of Higher Education*. Retrieved from <http://chronicle.com/article/College-20-Reaching-the-Last/123659/>
- Yunus, M. (2007). Malaysian ESL teachers' use of ICT in their classrooms: Expectations and realities. *ReCALL*, 19(1), 79-95.
- Zhao, Y. (2003). *What Should Teachers Know About Technology: Perspectives and Practices*. Greenwich, CT: Information Age Publishing.