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Mobile Collaborative Learning for Female Baby Boomer Students in Canadian Higher Education

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2017

Abstract

Mobile Collaborative Learning for Female Baby Boomer Students

in Canadian Higher Education

by

Holly Chui Ping Chun

MPhil, Chinese University of Hong Kong, 2001

BAS, Charles Sturt University, 1997

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Female baby boomer students (born 1946-1964) need to augment their skills in mobile collaborative learning because current knowledge of technologies is essential for making informed decisions. The purpose of this study was to determine the need to promote technologies based on the experiences of female baby boomer students. Andragogy and constructivism provided the conceptual framework for this research. The research questions were devised to investigate female boomer students' collaborative experiences using smart devices and barriers to their adoption of technology. This phenomenological study included 8 participants from a Canadian university recruited through purposeful sampling. Per the Modified Stevick-Colaizzi-Keen method, data were simultaneously collected via interviews, analyzed by coding, and organized into themes until saturation. Age was the main deterrent for technology adoption, and obstacles included embracing a new process, feeling that information was secure, and resolving technical difficulties. Results indicated that female baby boomer students were not ready to lead in the use of mobile collaborative learning and could not maintain rapid technological changes. Mature students may need training in cloud computing; a 1-semester blended course was proposed to enable these students to learn mobile technologies and collaborative skills. This study identifies the technology learning needs of baby boomer students, which will help those looking for ways to teach students in this age range. When leaders in their field of study know how to use current technologies, they will be more productive in their communities.

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Dedication

This dissertation is dedicated to my loving husband, Chris Chan. Only after you left home did I realize why you hesitated to support my pursuit of the doctorate. However, we could never go back. During our years apart, I appreciate your sacrifice for our family and me. I regret I was emotionally and physically distant, not only from you but everyone else. Still, you repaid my insensitivity by working overseas and contributing financially. Please understand that while I have spared my time from addressing your needs, I also long for your company. Finally, the quest is over. It is high time we reunite and try to make up for the lost time.

Acknowledgments

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The project is the product of collaboration supported by many parties and individuals. Professors David Mikulis and Karel terBrugge, and Tara Rosewall, Ph.D., were instrumental in the project's realization. Ricky Chan, my son and a graphic designer, designed the flyer for recruiting participants. My special thanks go to Asma Naheed for her input and encouragement. I apologize for not being able to acknowledge each person by name.

Deep appreciation is given to the research participants who told their stories and aired their opinions despite the meager stipend. I enjoyed each interview and felt a warm friendship from within. Fellow students at Walden University provide me with a sense of community. Especially, Suzanne Tinglin is my research buddy who cheers all the way. Staff members at Walden University provide a nurturing learning environment. Last but not the least, I must thank my past and present committee members Dr. Calvin Lathan,

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Section 1: The Problem

Introduction

Mobile collaborative learning in higher education is gaining popularity (Hashim, Tan, & Rashid, 2015; Sung, Yang, & Lee, 2017). In every discipline of higher education, students collaborate to tackle learning tasks. Collaborative learning promotes understanding, verbalization of implicit thoughts, and sharing of cognitive loads (Dillenbourg, 1999; Janssen, Kirschner, Erkens, Kirschner, & Paas, 2010; van Boxtel, van der Linden, & Kanselaar, 2000). Collaborative learning using mobile technology has additional advantages in connectivity, instantaneity, and individuality (Gikas & Grant, 2013; Sung et al., 2017). Being a part of the learning community, female baby boomer students must also participate in mobile collaborative learning, which, according to researchers, they will benefit from.

The learning experience of female baby boomer students in Canadian higher education can be improved by employing mobile devices for collaborative learning; however, older Canadian women underutilize the computer compared to the younger and male Canadian population ("2010 Canada digital year in review," 2011; Cooper, 2006; Czaja et al., 2006; He & Freeman, 2010; Selwyn, 2007). Female boomer students at a university in Toronto, Canada, underuse mobile devices for collaborative learning. This problem also occurs in many other countries (Cooper, 2006; Middleton, Veenhof, & Veenhof, 2010).

In this chapter, I discuss the rationale, significance, and the implications for this study below. I also conduct a literature review to unveil the problem and identify

solutions. I used constructivism and andragogy orientations as a conceptual framework for the study.

Through the literature review, I discovered baby boomer women could benefit more from learning when they used mobile devices and the Internet. With this study, I address the fact that there is little research available on mobile collaborative learning in female boomer learners. Because many baby boomers are leaders in different industries, augmenting their technological knowledge may result in increased competitive power.

Definition of the Problem

Female boomer students in Canadian higher education underuse mobile devices for collaborative learning, which could be used to further benefit from collaborative learning (Belenky, Clinchy, Goldberger, & Tarule, 1986; Cozolino, 2008; Cross, 1998; Panitz, 1997; Smith, 2010; Yang & Williamson, 2011). Using mobile devices for collaborative learning suits the boomer women's busy life (Cross, 1992; Gouthro, 2004; Kennedy & Vaughn, 2004; Reiter & Gouveia, 2010; The Organization for Economic Co-operation and Development [OECD], 2012), and using mobile Internet reduces geographical and physical restraints.

Canadians are teeming Internet users ("2010 Canada digital year in review," 2011; "Canada digital future in focus," 2015), however, women and older Canadians do not use smart devices (SD) as much as young Canadian men (Rosenblum, 2012). These adults may refrain due to insecurity about the stereotype that older adults and females are not computer competent ("2010 Canada digital year in review," 2011; Cooper, 2006; Czaja et al., 2006; He & Freeman, 2010; Selwyn, 2007; Wagner, Hassanein, & Head,

2010). Despite this problem, not many studies on the relationship between Canadian boomer women and mobile collaborative learning are available.

The purpose of this study was to explore how female boomer students at a university describe their experiences with mobile collaborative learning. The results of this study can be used for promoting mobile collaborative learning to improve learning experiences for boomer women in higher education. If female boomer students take advantage of mobile collaborative learning, they can become more prepared for their careers after graduation. Canadian female boomers graduating from higher education will become a valuable resource to a job market characterized by labor shortages (Grant & Blackwell, 2012; Lefebvre, Simonova, & Wang, 2012).

Rationale

Evidence of the Problem at the Local Level

More Canadians 55 or older are continuing to work past retirement age, and the trend is more pronounced in women (Fields, Uppal, & LaRochelle-Côté, 2017). In 2016, a record high of 38% older Canadians constituted 36% of the labor market (Fields et al., 2017). Within this age group, the participation rate was greatest in people with bachelor degrees or higher (48%) because education favored employment (Fields et al., 2017; OECD, 2014, 2016). Taylor (2014) also found that university degree holders were more likely to delay retirement than people with lower educational attainment. To meet work requirements, many workers need to update their knowledge and skills (Cross, 1992; Holst, 2006).

In 2011, 4% of undergraduate and 7.5% of postgraduate students in the United States were older than 50 (Green, Coke, & Ballard, 2013). Some characteristics of older learners include decades of life experiences, diminished working memory, and physical aging. They demand analysis of learning behaviors as a separate group; however, Barr (2016) stated that studies on learners older than 50 were scarce. Although many 50+ students in higher education were female boomers, they are underrepresented in the literature (Aagard, Antunez, & Sand, 2015; Barr, 2016).

There is no information about how female boomer students at Canadian universities use mobile technology for collaboration. However, because senior Canadian women underuse the Internet, it is possible that female boomer students also underuse the technology. Because mobile collaborative learning can improve the learning experience (Cross, 1992; Gouthro, 2004; Kennedy & Vaughn, 2004; OECD, 2012; Reiter & Gouveia, 2010), an investigation can determine a need for intervention.

Evidence of the Problem from the Professional Literature

The literature shows a consistent digital divide between genders in many parts of the world, including Canada, the United States, Taiwan, the United Kingdom, and Australia (Cooper, 2006; Middleton et al., 2010). Researchers have found equal adoption to mobile learning in both genders (Al-Emran, Elsherif, & Shaalan, 2016; Snell & Snell-Siddle, 2013); however, women demonstrated lower self-efficacy, especially with ease of use, and experienced more peer influence compared to men regarding mobile learning (Bao, Xiong, Hu, & Kibelloh, 2013; Tarhini, Hone, & Liu, 2014). Stewart (2016) also found that female students were less capable in technology than their male counterparts.

Still, research results contradict each other, which could be due to different research parameters (Bao et al., 2013).

There is also a digital divide between ages, as older adults do not use the computer as much as younger adults ("2010 Canada digital year in review," 2011; Czaja et al., 2006; Middleton et al., 2010; Wagner et al., 2010). Researchers (Snell & Snell-Siddle, 2013; Wang, Chen, & Chen, 2017) identified age as a barrier to adopting mobile technologies in learners. In Canada, a digital divide moderated by age and gender still prevailed (Haight, Quan-Haase, & Corbett, 2014).

Female boomer students must overcome both digital divides before they can benefit from mobile collaborative learning. Despite higher prevalence in higher education, the success rate of nontraditional students is lower than traditional students (Taniguchi & Kaufman, 2005; Zhang & Palameta, 2006). Means of improving the learning experiences, such as adoption of mobile collaborative learning, should be promoted. Moreover, a profile of female boomer students as computer users is not available in the Canadian education system. The aim of this research was to explore the experiences of use, or disuse, of mobile collaborative learning in female boomer students.

Definitions

The following list includes important terms used throughout the document in order to provide context.

Adult learners/nontraditional students/mature students: An adult learner is an adult pursuing knowledge or skills, an adult being someone 21 or over (Merriam, Caffarella, & Baumgartner, 2007, p. 55). The terms *adult learners, nontraditional*

students, and *mature students* are often used interchangeably and in contrast to the traditional students who are 18 to 21 years old. The term nontraditional students in higher education generally refers to full-time or part-time students who are 25 years or older, financially independent, employed, and/or have dependents (Kerr, 2011; Merriam et al., 2007; Taniguchi & Kaufman, 2005). The Ontario Ministry of Education (Ontario Ministry of Education, 2013) defined a mature student as a student who was at least 18 years old and had not attended day school for at least 1 year.

Canadian baby boomers: The U.S. government defines baby boomers as individuals born between 1946 and 1964 in the United States (Colby & Ortman, 2014). In Canada, the era of the baby boomer generation started when a sharp increase in birthrate (15%) was observed in 1946, 1 year after World War II ended. A large drop in birthrate between 1964 and 1965 marked the end of the baby boom (Statistics Canada, 2012c). The common range (1946-1964) is used in this paper.

In some literature, the terms *boomer* and *baby boomer* are interchangeable (Fee, 2010; Marshall & Ferrao, 2007; Thompson & Foth, 2003). In this study, the population of study is designated as female boomer students.

Collaborative learning: Collective efforts by a group of learners that may improve learning outcomes by a whole team working together on an assignment and learning during the process (Janssen et al., 2010). Collaborative learning can occur in groups of two or 30 learners, and the duration can be an hour or 1 academic year. Interactions can be any combination of scenarios such as in person or online, synchronous or asynchronous, with different frequencies and time intervals (Dillenbourg,

1999). Collaborative learning involves interpersonal interaction and the key approach is discussion because learners verbalize their understanding (van Boxtel et al., 2000).

Higher education: All postsecondary institutions in Canada, as grouped together by Statistics Canada:

> The higher education sector is composed of all universities, colleges of technology and other institute of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of, or administered by, or associated with, the higher education establishments. (2010)

Learning community: Cross (1998) defined learning communities as "groups of people engaged in intellectual interaction for the purpose of learning" (p. 4). Learning communities are often structured, such as in a course (Cross, 1998; Panitz, 1997; Tosey & Gregory, 1998. The "sense of belonging, ownership, and influence" (Tosey & Gregory, 1998, p. 77) associated with a learning community is especially pertinent for women (Belenky et al., 1986).

Mobile collaborative learning: "Mobile Collaborative learning (MCL) is when [a] learner is using Mobile and Wireless Smart Devices (MWSD) or simpl[y] say Smart devices (SD)" (Baloch, Abdulrhaman, & Ihad, 2012, p.34). In recent years, higher education has adopted social networking apps as educational tools (Domizi, 2013; Tess, 2013). Students who use mobile devices and social media can access teaching material instantaneously, engage well with the content, and communicate with each other with ease (Gikas & Grant, 2013). Some teaching institutions use custom-designed software

(Conole, 2010) or systems from vendors such as Blackboard while others adopt apps such as Twitter that are downloadable from the web. Typically, students complement the systems provided by schools with social networking software. Students switch between platforms when they encounter technical problems (Kearns & Frey, 2010).

Significance

Despite the benefits of mobile collaborative learning, researchers have not examined female boomer students' experience with this type of learning. Knowing about this group is useful because there is a severe labor shortage of highly skilled and well-educated workers. Baby boomers constituted 27% of the Canadian population in 2011 when they were between 47 and 65 years old (Statistics Canada, 2012a). This cohort of individuals is moving toward retirement age, but some boomers stay in the workforce (Carrière & Galarneau, 2011). Many of them have not had formal education for an extended period and must refresh their skills to meet current working requirements (Cross, 1992; Holst, 2006). This large group of experienced workers is a potential labor source once their skills are polished and updated. Knowledge about the needs and challenges of women boomer learners can be used to foster studies and promote success, facilitating the integration of this group into the job market.

Barr (2016) stated higher education institutions in the United States neglected the growing trend of older students, which appeared to be the same in Canada. Through this research, I intended to suggest means to promote mobile collaborative learning for these students.

Guiding/Research Question

Female boomer students in higher education may benefit from mobile collaborative learning; however, older adults and women do not use the computer as much as younger males. The underlying reason is a stereotype that senior women are not computer compatible, dissuading the use of mobile collaborative learning.

The research questions for this phenomenological study are:

1. How do study group members describe their experiences with mobile collaborative learning?
2. How do study group members describe their attitudes toward learning with an SD?
3. What barriers do the study group members perceive to using mobile technology?

These questions guided the exploration of underutilizing technology and promoting mobile collaborative learning to older female university students.

Review of the Literature

Because boomers are currently in their 50s to 70s, the study focus was older female adult learners. Articles from 30 years ago would discuss boomers as young adults, which is inapplicable for this study. Current articles about baby boomers and education typically depict boomers as parents (or grandparents) instead of students. There is a scarcity of relevant articles, but articles on related topics such as adult learners, older adults, gender issues, higher education, Canadians, computer, the Internet, social networking, and combinations of the above are too numerous to be manageable.

The literature search started at the Walden Library, using multidisciplinary databases such as Academic Search Complete, ProQuest Central, and ScienceDirect. Queries to Google Scholar and Google Search resulted in additional sources. When searching for medical journals indexed by Medline, I sought articles from other libraries. Textbooks and reference books in both paperback and electronic formats supplemented the references. The websites cited were either published by government agencies or nonprofit research organizations which I considered credible, such as Statistics Canada. Most educational research or censuses only reported data on younger students while the demographics of baby boomer students were not clear. Despite the effort to customize the search, for instance, by province, age, and sex, a clear picture was still unobtainable due to lack of appropriate data.

Conceptual Frameworks

Collaboration is consistent with the constructivism and andragogy orientations. In a learning community, teachers and students collaborate to construct knowledge, learn, and develop together (Cross, 1998). In the social constructivist view, knowledge is constructed through dialogue and activities of individuals in the society where experience, context, and culture are vital (Knowles et al., 2005; Merriam et al., 2007).

Those using andragogy and constructivism theories emphasize the importance of experience (Knowles et al., 2005; Merriam et al., 2007), and sharing experiences is imperative in both theories. According to the andragogical model, adult learners are equipped with experiences that define their self-identity (Knowles et al., 2005). They feel rejected if their experiences are ignored; therefore, an inclusive and respectful

atmosphere fosters learning. During discussion and interactions these learners examine the new information and compare experiences (Knowles et al., 2005). Together, they share and synthesize the new and old material and construct new knowledge.

Constructivism theory is particularly applicable to the female boomer population. Researchers use the theory to explain that learning is achieved by constructing meanings from experience and social construction through dialogue and collaborative learning. Each of these processes will lead to transformation (Merriam et al., 2007; Mezirow, 2000). Female boomers have experienced life events that have transformed them, which they will continue to experience during education. They are empowered by education and in return further contribute to society. Female boomer students benefit from sharing their experiences with peers in collaborative learning.

Reasons for Baby Boomers to Pursue Higher Education

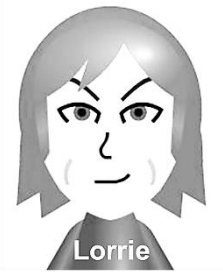
The main reason for adult participation in education is career-related (Aslanian, 2007; Barr, 2016; Hoover, 2009; Merriam et al., 2007). Well-educated Canadians have advantages in employment and earning power. In 2015, 83% of Canadians with a university degree were employed, which was higher than the overall national employment rate of 76% (OECD, 2016). In 2009, only 55% of Canadians who did not complete high school were employed (Statistics Canada, 2012b). University graduates earned substantially more than those who did not own a degree (Frenette & Coulombe, 2007; Frenette & Zeman, 2007; Statistics Canada, 2011). OECD (2014) reported that in 2011 Canadians with university degrees earned 60% more than those who completed high school.

Three to 4 decades ago, when baby boomers were school-aged, they received intensive formal education. However, the half-life of knowledge is rapidly diminishing. Knowledge doubles every 18 months (Gonzalez, 2004), meaning what people learn quickly becomes outdated, and this time span is decreasing. Cross (1992) commented, "But change is now so great and so far reaching that no amount of education during youth can prepare adults to meet the demands that will be made on them" (p. 2). Every person, including baby boomers, must update knowledge constantly to keep up with the changing world. Technologies increase productivity and save labor to the point that they displace many low-skilled workers from jobs (Holst, 2006). However, employers have difficulty recruiting highly skilled workers and employees working at knowledge intensive levels.

One of the main reasons baby boomers enroll in education may be changes in their lives. Aslanian and Brickell (cited in Merriam et al., 2007) hypothesized life events were the driving force behind adults who pursue learning opportunities: "Those going through transitions, such as marriage, retirement, job changes, birth of children, and so on, were able to identify specific events, such as getting fired or promoted, that triggered their transition" (p. 63). While the reasons why young adults pursue higher education are well understood, the reasons for baby boomers to do so are not as thoroughly studied. The primary reason baby boomers pursue higher education is to advance career goals (Schaefer, 2010). Hoover (2009) stated many retired boomers stayed in the workforce out of necessity because of the economic downturn. Other boomers participated in education to stay active, alert, and connected to the community (Hoover, 2009; Merriam et al., 2007). Figure 1 summarizes reasons for baby boomers to pursue education.

After being laid off, Fred needs new skills for a job hunt.

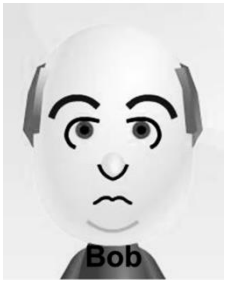
Mary needs to learn new skills after her promotion.



Lorrie is updating her knowledge for career enhancement.

Will opts to continue working despite reaching the retirement age.

May is recently divorced and needs to support herself.



Bob left his labor job after he was handicapped. He needs new skills for a new position.

Jack is retired, but he wants to stay connected with the younger generations.

Lisa wants to continue her education, which she gave up earlier.

Figure 1. Why do these people need education? Adapted from "How Can Constructivism Help the Middle-aged Learners?," by H. Chun, 2009, unpublished manuscript. Images by R. Chan and R. Chun, August 12, 2009, from http://makewee.com.

The Importance of Higher Education

Higher education is beneficial in the micro, meso, and macro levels. Bosworth (2008) stated the increase of productivity and economic boost in the United States over the past decades was due to increased education attainment. For the individual, higher education attainment is positively related to employment and income (Bosworth, 2008; Madore, 1992; OECD, 2014, 2016). On the meso level, industries and businesses gain productivity from educated employees who also require less supervision. In some industries, introducing technology such as high precision machines can reduce problems and decrease the need for training (Holst, 2006). A worker's role in the production line may change from manufacturing products to operating and/or monitoring machines and troubleshooting, which may require more knowledge and different reasoning abilities. With rapid progress of technology, workers need to update their knowledge constantly to ensure competence. Enterprises benefit from actively investing in staff development. On the macro level, education is associated with high employment rates, high income, and provision of high-quality products and services that benefit the society (Madore, 1992). The Canadian government addressed the importance of education as "*Learn Canada 2020* recognizes the direct link between a well-educated population and (1) a vibrant knowledge-based economy in the 21st Century, (2) a socially progressive, sustainable society, and (3) enhanced personal growth opportunities for all Canadians" (Council of Ministers of Education, Canada, 2008, p.1). Therefore, increasing citizens' education attainment is a worthy investment for society.

The Labor Shortage in Canada

The Canadian workforce. In 2011, 42.4% of the Canadian working population (aged 15-64) was classified as baby boomers, meaning older workers have outnumbered younger workers for the first time. The ratio between younger Canadian workers (15-24 years old) and older workers (55-64 years old) dropped from 1.4 in 2001 to 0.99 in 2011. If people retire in the traditional fashion, more people will be leaving than entering the job market (Statistics Canada, 2012a); however, the pattern of retirement is changing.

More people 55 or older stay in the work force than before. Carrière and Galarneau (2011) suggested longer life expectancy and better health were the main reasons for delaying retirement. Advances in technology enable seniors to continue working because jobs have become less labor intensive (Carrière & Galarneau, 2011). This trend is more prevalent in older women than in men, because women's employment has increased during the last decades and many of them also opt to delay retirement (Carrière & Galarneau, 2011). Many boomers delay their retirement because of financial necessity. Subsequently, many of them need to update and upgrade their skills to stay in the workforce (Cross, 1992; Holst, 2006).

The labor shortage. Despite the economic downturn, there is a labor shortage across Canada. Specifically, professions that require highly skilled workers experience more hiring problems (Grant & Blackwell, 2012; Lefebvre et al., 2012). Lefebvre et al. attributed the labor shortage in skilled trades to education and aging of baby boomers. In 2011, male and female Canadian boomers both constituted 14% of the population, together making up almost 29% of Canadians (Urquijo & Milan, 2011). These figures

are large enough to impact the job market when many skilled and experienced baby boomers are due to retire. Furthermore, Lefebvre et al. alleged the current education system dissuaded young people from entering skilled trades.

Currently, there is a mismatch between recruitment and availability of corresponding talents. Employers in some provinces, such as Newfoundland and Labrador and the western provinces, have difficulty recruiting highly skilled personnel in science, technology, and engineering (Grant & Blackwell, 2012), despite a high national unemployment rate of 6.8% (Statistics Canada, 2017). These fields are traditionally male-dominated professions.

The Canadian government has addressed underrepresentation of women in professions such as construction, transportation, and heavy machinery. They have also identified women's participation in these areas to lessen the labor shortage (Fry, 2010); however, if young women fill jobs created by men who retire, that will create vacancies in jobs traditionally held by women. The two problems, namely diminishing workforce and skill mismatch, will persist. Baby boomers that want to stay employed and whose skills are updated to meet current job requirements can fill empty roles. Some baby boomers may opt for higher education to gain accreditation to be employable in jobs that require specific skills, knowledge, and competence in current information technologies.

Challenges to Learning that Affect Canadian Female Boomers

The most prominent characteristic of a female boomer student is her age. A Canadian female boomer needs to consider her age and commitment as a female in the process of deciding to pursue higher education. Older learners face challenges that are

different from school-aged students. Learning is generally associated with young people, which leads to ageism, especially against females (Cross, 1992; Kennedy & Vaughn, 2004; Merriam et al., 2007). Another challenge Canadian women must overcome is balancing work, marriage, family, and/or caregiving in the family with commitment to education. Unfortunately, the much-needed family support to pursue education may not always be present (Kennedy & Vaughn, 2004).

Challenge 1: Women's higher education and relationships. The traditional gender role has changed over time, impacting relationships between men and women. A woman is more than a wife, mother, and home-maker. In Canada, increasingly more women were employed (Moyser, 2017) and attained higher education qualifications in the past two decades (Turcotte, 2011). Roles within a household are no longer determined by gender but related to education and earning power (Lemoine, Mayer, Gordon, Johnson, & Budden, 2011). Pursuing education sometimes causes tension in relationships, as research has shown people preferred their spouse to have less education than themselves (Lemoine et al., 2011). A husband may feel threatened when the wife pursues a higher qualification than himself.

Due to relationship tension, conflict may happen when the wife returns to school because she may end up earning more than her husband (Gouthro, 2004; 2005). Because earning power is positively related to education (Madore, 1992; OECD, 2014, 2016), either spouse can pursue additional education to increase the financial contribution to the family. Educational homogeny, when both spouses attain the same education level, has become more common than in the past (Blossfeld, 2009; Turcotte, 2011); however, the

traditional perception that the man should be the breadwinner of the household still prevails (Bertrand, Kamenica, & Pan, 2015; Blossfeld, 2009; Juhn & McCue, 2017). Despite increased educational hypogamy, where a wife attains more education than the husband, the husband still earns more income than the wife in most heterosexual marriages in the United States (Bertrand et al., 2015; Qian, 2016). The lower divorce rate in female educational hypogamy than in the past, however, could be due to decreased availability of well-educated men (Qian, 2016; Schwartz & Han, 2014).

A man may also feel challenged when his wife pursues education because he considers it an act of assertion against his role of decision-maker in the family (Stalker, 2001). A recent study revealed an increasing trend in patriarchy in millennials (Donnelly et al., 2016), which leads to the view that a woman's primary roles in the family are mother and caregiver (Juhn & McCue, 2017; Kornrich, Brines, & Leupp, 2013; Stalker, 2001). In this view, a woman must also make the husband her first priority (Stalker, 2001). A woman's commitments to school would conflict with these patriarchal views (Stalker, 2001); although a male partner may agree to provide support, he may implicitly undermine the commitment (Gouthro, 2004). Frequently, a man's support is subject to the condition that the woman must complete all housework without exception, on top of school work (Blossfeld, 2009), which makes a woman's study peripheral to family commitments (Gouthro, 2004; Gouthro, 2005; Stone & O'Shea, 2013). This does not take into account some women also preform paid and/or volunteer work outside of the home.

As a result, some husbands do not allow time for studying (Kennedy & Vaughn, 2004). A husband may not appreciate his wife's redistribution of time and energy for studying because that means spending less time and effort for housework. Sometimes a husband is reluctant to help with housework while the wife attends school (Gatua, 2009). For example, a colleague revealed her husband promised to take care of the children while she was at school, but he went out with his friends instead. She supported her husband when he pursued his education and was disappointed when the he did not reciprocate (A. Naheed, personal communication, June, 2011). Women find the lack of support from their spouse frustrating or even a liability to the relationship (Kennedy & Vaughn, 2004).

Gatua (2009) mentioned in some cultures, the extended families and the practice of sharing childcare could be resources for a woman student. However, my colleague commented that sometimes the extended family discouraged a woman from attending school because she was spending money instead of earning it (A. Naheed, personal communication, August, 2012). Furthermore, some parents could not understand and would not support mature daughters returning to school. They alleged a husband, a job, and/or children were all a woman needs (Kennedy & Vaughn, 2004).

Lastly, higher education fosters development in women's relationships. One research subject commented "Education empowered me professionally and in my marriage. I've learned how to exist and exist comfortably and still have my way, at least my share of the time" (quoted in Kennedy & Vaughn, 2004, p. 26). Effects on a

relationship can be a challenge and sometimes deter a woman's decision to participate in higher education.

Challenge 2: Cognitive and physical aging. Physical and cognitive characteristics change during the course of life. Cognitive decline is a big deterrent to learning. The main cause of age-related decline is processing speed, which increases from infant to the 20s and then gradually decreases (Craik & Bialystok, 2006). Cognitive aging is not just detected when comparing the young and elderly populations. Feeney, Howard and Howard (2002) measured a decline from the early 40s to the late 40s. Craik and Bialystok (2006) reviewed this topic comprehensively. They suggested cognitive performance was a balance between representation and control.

Crystallized intelligence. Representation, or crystallized schemas, is related to memory, experience, and knowledge. Knowledge of the world around an individual is constructed in a scaffolding manner (Fosnot & Perry, 2005). Context is important for representation by selecting the relevant knowledge from the memory system (Craik & Bialystok, 2006). Older people have difficulty memorizing names or specialized terms, which can be improved when supported by context as clues (Craik & Bialystok, 2006). This method echoes the children who must make connections when memorizing lessons. According to Craik and Bialystok, context is important to both the young and the old, but less important in adults. Crystallized intelligence accumulates throughout life until the 70s (Craik & Bialystok, 2006).

Fluid intelligence. Control, or fluid operation, peaks when a person is in the 20s and then gradually declines. It is the ability to identify complex and unfamiliar

relationships and make inferences about them. This process requires little general knowledge and is also referred to as working memory (Craik & Bialystok, 2006). Young people are quick to investigate and easily become comfortable with new technologies. For example, children are quick to learn and master certain computer operations even without being taught (Mitra & Rana, 2001).

Cognitive aging negatively impacts learning (Nassar et al., 2016). The main concerns are learning speed and retaining information. Thus, older people have difficulties learning new knowledge. Figure 2 represents the situation.

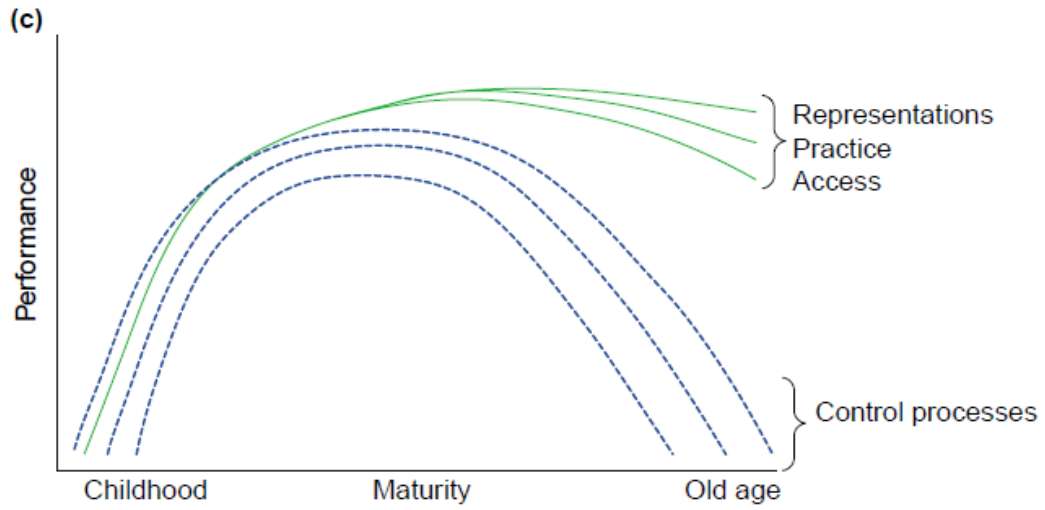


Figure 2. Cognitive development throughout lifespan. Control (fluid intelligence) reaches its peak in the 20s then declines. Representations (crystallized intelligence) are preserved until the 70s, with some loss due to lack of practice and the inability to access (recall) archived information. This diagram is reproduced from part of a diagram in "Cognition through the lifespan: Mechanisms of change," by F. Craik and E. Bialystok, 2006, *Trends in Cognitive Sciences, 10*(3), p. 131. Copyright 2006 by Elsevier Limited. Reprinted with permission (Appendix B).

Craik and Bialystok (2006) suggested that an old person could retain existing information but had difficulty learning new knowledge. Another group of scientists

found that better educated elders performed better than their less educated counterparts in cognitive tests (Wilson et al., 2009). They suggested education attainment correlated with risk of dementia and Alzheimer disease, and the impairment might not be evident as quickly in better-educated individuals (Wilson et al., 2009). The research supported education's role in alleviating cognitive effects associated with the aging process. "People do not simply and inexorably decline in mental ability as they grow old. Their everyday experiences may also degrade or enhance their ability to cope with the demands that their lives make upon them" (Rabbitt, Lunn, Wong, & Cobain, 2008, p. 240). Cognitive aging varies among individuals, but several cognitive abilities can simultaneously decline in an individual (Ghisletta, Rabbitt, Lunn, & Lindenberger, 2012). Vision and hearing deterioration also inhibit learning in an aging person.

Physical aging: Vision. Visual impairment due to aging not only hinders learning, but also impedes normal functions (such as shopping or commuting), which in turn impacts the aging person socially and physiologically (Cimarolli, Boerner, Brennan-Ing, Reinhardt, & Horowitz, 2012). However, this can be corrected by using spectacles and reading under adequate lighting conditions (Wlodkowski, 2008). Reading materials formatted for readers with visual challenges are available (Stephen, 2009). A reader can also switch to audio books or use aids such as a magnifying glass (Cimarolli et al., 2012; Stephen, 2009). For many readers, using an electronic device with multi-touch function can solve some problems because users can magnify the display simply by touching the screen with their fingers (Gamberini et al., 2006; Rodríguez, Gonzalez, Favela, &

Santana, 2009). Also, older people need extra time to process visual signals (Wlodkowski, 2008). Adequate time should be allocated to allow for this need.

Physical aging: Hearing. Hearing loss is often associated with aging (Lin et al., 2011; Tun, McCoy, & Wingfield, 2009; Wlodkowski, 2008). Presbycusis, or age-related hearing impairment (ARHI), is a complicated disorder (Van Eyken, Van Camp, & Van Laer, 2007). Older people often present with gradual symmetric hearing loss especially at higher pitches (Merriam et al., 2007; Van Eyken et al., 2007; Wlodkowski, 2008). Poor hearing leads to communication problems, which in turn causes social withdrawal and other types of cognitive decline (Lin et al., 2011; Van Eyken et al., 2007).

Some researchers (Tun et al., 2009) found that older people used more resources (in terms of working memory) when they strained to hear and comprehend verbal communications. The hard-of-hearing seniors find it challenging to understand fast speech and difficult to recall verbal content due to diminishing processing speed or working memory (Craik & Bialystok, 2006; Tun et al., 2009; Wlodkowski, 2008). Working memory declines gradually from early adulthood (Craik & Bialystok, 2006) and appears to join force with physiological aging and result in presbycusis. Wu and Chiu (2016) also found an association among age, hearing impairment, and memory decline.

Although a hearing aid is a treatment for hearing loss, a hearing aid cannot improve the wearer's comprehension because it only amplifies sound (Merriam et al., 2007; Van Eyken et al., 2007; Wlodkowski, 2008; Wu & Chiu, 2016). Furthermore, its function diminishes in a noisy environment (Van Eyken et al., 2007). In addition, some people who would benefit by using hearing aids do not feel the need, or do not want to

use them due to negative stereotyping that associates the device with old age (Merriam et al., 2007; Van Eyken et al., 2007).

Teachers should allow adequate time for older learners to process information. Instructors should talk clearly, loudly, and speak at an appropriate speed, while closed captioning (Merriam et al., 2007) enhances recognition and comprehension.

Ways to Enhance Learning in Older Adults

Comprehension and memory. Reading comprehension declines with age (Hannon & Daneman, 2009). Hannon and Daneman (2009) found text memory, text inferencing, knowledge integration, and knowledge retrieval were weaker in older readers than in younger adults. In older readers, accessing newly acquired data was more difficult than recalling from prior information (Hannon & Daneman, 2009). This finding was consistent with the notion that older people were inept learners (Craik & Bialystok, 2006).

Concentration is vital for retaining knowledge. Young adults showed impairment in memory trials when they were distracted during the study phase (Cooper & Odegard, 2011). Conversely, young adults who studied with full attention but were distracted during retrieval showed no memory deficit (Cooper & Odegard, 2011). Lustig, Shah, Seidler, and Reuter-Lorenz (2009) also found encoding (studying) played a bigger part than retrieval in memories. Thus, paying full attention and avoiding distraction while studying could enhance memory.

Regardless of age, retrieval improved with increased study time (Souchay & Isingrini, 2004). When learners encountered material they judged to be difficult to recall,

both categories of learners deployed additional time on the task, but older learners tended to allocate less time to study the information than their younger counterparts (Souchay & Isingrini, 2004). Due to the reverse relationship between the *feel of knowledge* and study time (Souchay & Isingrini, 2004), studying beyond the sense of acquisition is counterintuitive; however, this can become a strategy to compensate for memory decline. Older learners should deploy extra study time to ensure retention.

Also, researchers found that a longer time interval between stimuli improved recalling performance in adults, but this method could not improve age-related memory deficits (Meijer, de Groot, Van Boxtel, Van Gerven, & Jolles, 2008). Therefore, undistracted learning is imperative for learning. Allowing adequate time and avoiding multitasking can facilitate learning and recollection. Lastly, switching tasks and avoiding overloading appeared to improve performance (Lustig et al., 2009). This is consistent with the traditional wisdom that a learner should take short breaks when studying.

Older learners benefit from practice (Beaunieux, Hubert, Pitel, Desgranges, & Eustache, 2009; Craik & Bialystok, 2006). When learning is translated to performance, improvements following practice are more pronounced in older than younger adults (Beaunieux et al., 2009). Experience and practice are the contributing factors to expertise in an area (Craik & Bialystok, 2006), in favor of senior workers.

The social brain and learning. The human brain is a social organ and learning is enhanced through personal interactions (Cozolino & Sprokay, 2006; Meloni, 2014). Cozolino and Sprokay stated “Current trends in neuroscience are unveiling more evidence that human brains need social interaction to promote neural plasticity” (2006, p.

17). Learners need to be accepted and supported in the course of learning (Cozolino & Sprokay, 2006).

In addition, Brookfield (1999) described three emotional responses of adult learners, namely, impostership, cultural suicide, and lost innocence. Impostership is the learner's implicit lack of confidence during the pursuit of higher education (Brookfield, 1999). Cultural suicide refers to the feeling of betrayal when family and friends find the enlightened learner transforms into a critical thinker (Brookfield, 1999). Lost innocence is the frustration that a learner feels upon discovering the complex and multi-faceted nature of inquiry at the tertiary level (Brookfield, 1999). A community is important for adult learners to overcome emotional challenges and find comfort and support when they share their experiences (Brookfield, 1999).

Older learners learn best in a supportive and safe environment (Cozolino, 2008). They find a sense of belonging as they share experiences in communities. Moreover, experiences are vital in adult learning. The andragogy theory (Knowles et al., 2005) stated adult learners were equipped with experience, which must be integrated when they learned and assimilated new knowledge. The constructivism theory also stated learners made meaning of information and built their knowledge base through discourse in communities (Fosnot & Perry, 2005). Peer support is important for older learners, including baby boomers (Schaefer, 2010).

Culture, context, and narratives. Older learners are deeply influenced by culture and context (Cozolino, 2008). Rossiter (1999) stated that a person's life narrative reflected the meanings of a complex matrix of familial, religious, socioeconomic, and

cultural contexts. Learners made meaning of the world through these narratives (Rossiter, 1999). Cozolino (2006) observed that adults learned best when they could relate new information to their experience, which is consistent with constructivism (Fosnot & Perry, 2005) and andragogy (Knowles et al., 2005) theories.

Discussion. In contrasted to attending a lecture or self-study, discussion is a participatory activity. A discussion is different from a debate because participants verbalize their diverse implicit beliefs and perspectives in an inclusive environment (Brookfield, 2004). Mezirow (2003) stated that participants should be open-minded, non-judgmental, and primed to challenge their own assumptions. Again, learning through dialogues is a social activity. Peer interactions satisfy the brain's needs for socialization, boost emotional comfort, and enhance learning.

Roles of the teacher-mentor. Adults develop through education. Daloz (1999) conceptualized learning as a transformational journey, and the mentor as a fellow traveler. Merriam, et al. (2007) commented, "The mentor serves as guide, cheerleader, challenger, and supporter during the learning process" (p. 138). A mentor-mentee relationship emphasizes personal interaction. This is especially relevant for women. Many women embrace implicit knowing, which externalizes and develops through sharing and discussion, but is weakened by mistrust (Belenky et al., 1986). In the student-centered andragogy theory (Knowles et al., 2005), the teacher was also portrayed as a resource person and a co-learner.

Summary of learning challenges due to aging. Although normal aging correlates with the decline of cognition and memory, older people are still capable of

learning (Boulton-Lewis, 2010; Merriam et al., 2007; Wlodkowski, 2008). Physical changes such as visual and auditory challenges demand resources regarding working memories (Tun et al., 2009); however, use of mnemonics and corrective devices can reduce stress incurred in studying. Also, ample and undistracted study time ensures adequate function in the encoding phrase, and in turn facilitates internalization and finally retrieval of material. Switching tasks, taking frequent short breaks, and avoiding overwork are beneficial for learning.

Finally, Lustig et al. (2009) mentioned multimodal approaches, including social elements. Older learners benefited from engagement in activities, such as volunteering, that increased interaction with others (social aspect) and involved different tasks (cognitive aspect). A group of older participants, who were inferior to a younger group, caught up until both groups performed similarly in completing some tasks. The researchers ascribed the improvement as a function of collaborative social interaction (Derksen et al., 2015). The collaborative success happened when partners knew each other, while the results would be different for groups of strangers working together (Derksen et al., 2015). The finding highlighted the importance of a supportive learning community.

The Internet and Collaborative Learning

Computers and associated technology, particularly the Internet, are the most prominent feature of contemporary technology. In fact, the technology has become an integral part of everyday life because computers handle vast amounts of information and computations that shape today's living. The use of computers has infiltrated areas such

as banking, shopping, entertainment, and education, to name a few. Additionally, many operations are performed online through the Internet or intranet networks. For instance, if a garment is not available in one store, the store staff can check on the network and advise the customer which store holds an inventory.

The importance of computer training. Industries shift from labor-intensive manufacturing to mass production through major investments in machines and technologies (Merriam, Courtenay, & Cervero, 2006). This transition creates a bloom of advertising and media industries to encourage consumerism to compensate for the diminished profit (Merriam et al., 2006). Cross (1992) commented, "These wonders of technology have created and wiped out entire industries and occupations . . . and they have forced individuals to cope with change both as producers and as consumers" (p. 29). Together, technological advances and globalization form a chain reaction, which enhances and reinforces consumerism. At the same time, people must learn and use new technologies, either as an early adopter or a laggard or between the extremes.

On the work front, globalization and the advances of technology demand workers in almost all industries use computers routinely. Merriam et al. summarized the phenomenon: "Automation and robotics displace production workers but create other jobs. Technology creates alternative work structures. The need to be competitive in the world market leads to further technological sophistication" (2007, p. 21). Automation takes over many low-skilled tasks. Presently, most jobs require workers to operate, monitor, and control certain computer functions, and many such operations are executed online.

Either personal life or work demands adoption of technologies. For instance, even a microwave oven incorporates some computer technologies. A person must learn to control a multitude of household gadgets in order to be functional and independent. Studies found that seniors did not adopt technologies as well as young people (Broady, Chan, & Caputi, 2010; Czaja et al., 2006).

The Internet and learning. Baby boomers have transitioned from passively watching television to actively searching, appraising, and interacting online (Dede, 2005). On the Internet, almost everything is searchable, and multimedia is the predominant format. Besides text, much information on the web is accompanied by colorful photos, illustrations, animations, and videos. Unlike watching television in the past, an audience can pause, rewind, fast forward, and even download a file for later reviews. Much of the content on the web contains hyperlinks that allow users to extend their search and interact with the computer or other users.

Interactive, multimedia learning is particularly valuable for some disciplines such as nursing. A video or clinical photo of a patient explains the symptoms more effectively than written descriptions. With one click, relevant x-ray images are available for correlation. After studying, the student nurse can take a quiz while the system records the date of study and test results in real time. Books have become digital with graphics in vibrant colors, videos, links to various sources, and some other interactive components. Furthermore, a mobile device can store many books that would be bulky and heavy to carry.

Cloud computer and social media. Stantchev, Colomo-Palacios, Soto-Acosta, and Misra (2014) found that students stored and shared files using file hosting services such as Dropbox, where multiple users synchronized files across different devices, ensuring simple and accurate communication. Google Apps for Education, which allowed simultaneous editing and commenting amongst other capabilities, was popular with students (Brown & Hocutt, 2015). This form of collaboration is enabled by the availability of high-speed mobile Internet infrastructure, Web 2.0 platform, SDs, and services (cloud).

In recent years, higher education has adopted social networking apps as educational tools (Domizi, 2013; Tess, 2013). In past research, students who used mobile devices and social media could access teaching material instantaneously, engage well with the content, and communicate with each other with ease (Gikas & Grant, 2013). The most popular social media, Facebook and Twitter, were not conducive to formal discussions (Jacquemin, Smelser, & Bernot, 2014; Suwannatthachote & Tantrarungroj, 2013). However, Twitter facilitated dissemination of current information (Jacquemin et al., 2014), while some Facebook functions promoted group engagement (Suwannatthachote & Tantrarungroj, 2013).

Online discussion. Online discussion is another method of collaborative learning. Participants post text messages and upload files to the discussion board to initiate a discussion or respond to a topic. Through sharing and discussing participants can achieve three goals: problem solving, concept exploration, and attitude change (Brookfield, 2004, p. 210). In the constructivists' view, knowledge is constructed during

discourse when experiences are shared (Knowles et al., 2005; Merriam et al., 2007; Weasenforth, Biesenbach-Lucas, & Meloni, 2002). Social constructivists highlight the importance of interaction: "Without social support, knowledge construction was diminished to solitary reflective problem solving – reminding us of Piaget's cognitive approach" (Nyikos & Hashimoto, 1997, p. 516). Discussions foster critical reflection and should be conducted in an inclusive environment (Brookfield, 2004; Mezirow, 2003). Online discussions can be synchronous or asynchronous. A synchronous discussion resembles a face-to-face classroom discussion, except students can participate at any location via the Internet. Asynchronous discussion is typically hierarchically organized by threads (Weasenforth et al., 2002).

Asynchronous discussion is useful for older learners who tend to respond more slowly either due to working memory restraint or the need to retrieve and organize experiences. In an asynchronous discussion, participants can reflect and contemplate the question before posting their comments. This method encourages participation and is valuable for shy students or non-native speakers (Weasenforth et al., 2002). Yet, online discussions can be cumbersome because they usually involve logging onto the university network and many programs are neither user-friendly nor visually appealing.

Female Boomers' Mobile Collaborative Learning

Peer support, sense of community, and sharing of cognitive load augment boomer women's learning and contribute to the collaborative learning experience. Adding mobile devices provides flexibility regarding schedule, physical challenges, and geographic distances.

Collaborative learning is particularly suitable for boomer women because successful collaboration requires communication and social skills for explaining and coordinating the processes (Janssen et al., 2010), and most women excel in verbal communication (Hirnstein, Freund, & Hausmann, 2012). Because working memories in baby boomers diminish due to aging, learners can share cognitive load among members (Craik & Bialystok, 2006; Janssen et al., 2010; Tun et al., 2009).

Contemporary collaborative learners use devices such as smartphones, tablets, and laptops (Baloch et al., 2012). Boomer women learners benefit from mobile collaborative learning because they need to manage study and many other commitments concurrently. Mobile, asynchronous collaboration enables learners to connect with their peers at their own pace and wherever they desire. This flexibility is beneficial for commuting, part-time students who do not have adequate time to get acquainted with their peers; while peer support and a sense of belonging are essential for adult learners (Belenky et al., 1986; Cozolino, 2008; Cross, 1992; Cross, 1998; Panitz, 1997; Smith, 2010; Yang & Williamson, 2011). Adult learners were motivated towards mobile learning due to its seamless connectivity, especially for collaborative tasks (Hashim et al., 2015). Unfortunately, most students in the Hashim et al. (2015) study were younger than the boomers, leaving doubt about the relevance of the age group.

Challenges for Female Boomers to Adopt Mobile Computing Technologies

Older adults and women are stereotyped to be computer incompetent ("2010 Canada digital year in review," 2011; Cooper, 2006; Czaja et al., 2006; He & Freeman, 2010; Selwyn, 2007; Wagner et al., 2010). Some boomers may not recognize the

advantages and the importance of adopting the technology and choose not to use it (Wagner et al., 2010).

Age and computer and Internet use. In adults, age relates negatively to the use of computers and the Internet ("2010 Canada digital year in review," 2011; Czaja et al., 2006; Middleton et al., 2010; Wagner et al., 2010). Canadians spent the longest time online per user and made the most visits per user in 2010 ("2010 Canada digital year in review," 2011). In 2014, Canadians also ranked highest for the same metrics in desktop users worldwide ("Canada digital future in focus," 2015). Nonetheless, compared to younger Canadians, older Canadians spent less time online and used the Internet less frequently and for fewer types of activities (Middleton et al., 2010). However, research results about older computer users are inconsistent or even contradictory (Broady et al., 2010; Wagner et al., 2010). Still, several themes emerged, and these themes were quite consistent across the literature.

Important predictive factors for computer or Internet use are cognitive abilities, computer self-efficacy, and computer anxiety (Czaja et al., 2006; Wagner et al., 2010). During normal aging, fluid intelligence, attention span, and memory decline with diminishing vision, hearing, and psychomotor coordination functions (Craik & Bialystok, 2006; Czaja et al., 2006; Wagner et al., 2010). Older computer users frequently demonstrate lower accuracy and slower speed, and generally perform poorer than younger adults (Wagner et al., 2010). In a study, older adults (mean age of 67 years) often forgot how to find a function on the mobile device (Zhou, Rau, & Salvendy, 2014). Also, using the touch screen interface was difficult for older adults (Zhou et al., 2014);

however, these challenges can be overcome by practice. In a meta-analysis, Wagner et al. (2010) found that experience could enhance speed and performance.

People with higher computer self-efficacy are more likely to use computers (Broady et al., 2010; Czaja et al., 2006; Wagner et al., 2010). In general, old people's negative attitude towards computer stems from lack of experience (Broady et al., 2010; Wagner et al., 2010). Having a sense of achievement and being in a supportive environment improve users' confidence, which is particularly effective in motivating older computer users (Czaja et al., 2006). Moreover, increased computer knowledge and experience can reduce computer anxiety, another deterrent to computer use (Broady et al., 2010; Czaja et al., 2006; Wagner et al., 2010).

Overall, an inclusive and relaxed environment encourages older adults to use the computer. Allowing adequate time, using accessibility functions such as large fonts or captions reduce stress to older users, encourage computer use, and foster learning. Also, Hong et al. (2013) found that people who felt younger than their real age accepted technologies better than those who felt their chronological age. Other factors favoring computer use include education, socioeconomic status, and having access to the computer (Broady et al., 2010; Czaja et al., 2006; Wagner et al., 2010).

Older adults are pragmatic and selective (Wagner et al., 2010). Scerra (2016) found that older adults used mobile technologies when they realized the usefulness and found the devices easy to use. Another study compared two groups who used the new *near field communication smartphone entertainment systems*. The adult group (aged 25-44) considered usefulness and intuitiveness important attributes, while the youth group

(24 years or younger) thought convenience was the primary reason for adoption (Teh, Ahmed, Cheong, & Yap, 2014). Both studies revealed adults valued practicality.

Baby boomers and the computer and Internet. Silver surfers (older adults, including baby boomers) are the fastest growing group in Internet users ("2010 Canada digital year in review," 2011; Czaja et al., 2006; Middleton et al., 2010; Wagner et al., 2010). Besides being pragmatic, boomers command technology tailored to their needs (Rogers, 2009). One disincentive for older people to adopt technologies is the anticipation of problems or equipment breakdown, and boomers demand equipment to be easy to use and self-repairing (Rogers, 2009).

Increasingly more seniors engaged in social networking because they find social media useful for connecting with family and friends, especially grandchildren ("2010 Canada digital year in review," 2011; Rogers, 2009; Wagner et al., 2010). Seniors with limited mobility benefit most because they can reduce isolation by using social media (Cheek, Nikpour, & Nowlin, 2005). Some favor video chat because video enhances human contact ("2010 Canada digital year in review," 2011) by enabling nonverbal communications, such as gestures and facial expressions. Video chat also provides valuable visual cues for people who are hard of hearing (Choi, Krause, & Capitan, 2005).

Cozolino (2008) suggested older adults learn socially, which was pertinent for baby boomers' computer education. Many boomers learn from their children and then share experiences with peers (Rogers, 2009). Boomers are motivated to learn new technologies because they are driven by implicit pride and cannot bear to feel inferior or

left behind (Rogers, 2009). Boomers learn and adopt new technologies most effectively in a social setting.

The gender divide. Even today, there is a digital divide between the genders. Women use computers, the Internet, and mobile networks less than men ("2010 Canada digital year in review," 2011; Cooper, 2006; Czaja et al., 2006; He & Freeman, 2010; Ipsos Reid Corp., 2012; Middleton et al., 2010; Rosenblum, 2012; Selwyn, 2007; Wagner et al., 2010). He and Freeman (2010) concluded their research with "women are less computer-oriented than men" (p. 208). Furthermore, this phenomenon occurs at all ages and in different parts of the world (Cooper, 2006; Czaja et al., 2006; Lane & Manner, 2011; Middleton et al., 2010).

The primary reason for this disparity is stereotyping (Cooper, 2006; He & Freeman, 2010; Selwyn, 2007; Wagner et al., 2010). Studies showed that even when computer experiences were similar women generally had lower computer self-efficacy and more computer anxiety than men (He & Freeman, 2010; Middleton et al., 2010; Selwyn, 2007). He and Freeman (2010) and Wagner et al. (2010) also found females were less knowledgeable, and computer knowledge is a predictive factor of use (Czaja et al., 2006); however, these findings are not definitive.

Research methods and samples often influence the results. For instance, researchers commented Canadian women spent less time on the Internet because they were busier than men (Middleton et al., 2010). This could be true, but another reason could be another stereotype -- that women's role in the house was labor-intensive.

Moreover, because the research only measured Internet use at the home, this notion could not delimit the real computer-orientation in Canadian women.

According to the literature, computer use in boomer men and women was similar ("2010 Canada digital year in review," 2011; Rogers, 2009). More males than females used computers, the Internet, and mobile devices in all age groups (Cooper, 2006; He & Freeman, 2010; Ipsos Reid Corp., 2012; Lane & Manner, 2011; Selwyn, 2007). If both statements were true, then did it mean younger and older men use more computers than younger and older women, while boomer men and women used the same amount of technologies? Again, the findings may depend on how the research was conducted. Among computer or Internet users, rates of participation were similar for males and females. On the other hand, researchers found gender differences in use of computers and the internet.

Gender differences in computer use. Men and women tend to use the computer and the Internet for different purposes ("2010 Canada digital year in review," 2011; He & Freeman, 2010; Middleton et al., 2010; Selwyn, 2007). While computer gaming is a predominantly male activity, socializing is the female arena ("2010 Canada digital year in review," 2011; Cooper, 2006; Selwyn, 2007). Canadian men frequently go online to pursue different forms of entertainment, while Canadian women look up information on topics such as health and food ("2010 Canada digital year in review," 2011). When adopting the mobile Internet, men primarily consider job-related benefits while women consider efficiency (Wang & Wang, 2010). An abundance of functions fascinates men, even though some functions may be impractical (Selwyn, 2007). Women seek internet

activities that are useful and easy to learn and operate. Both men and women consider cost effectiveness and peer opinions when they choose a mobile device or service (Wang & Wang, 2010).

Knowing that female students experience higher computer anxiety than males (Cooper, 2006) is a surprise because today's young people have grown up with technology and are not expected to be intimidated. Once again, stereotyping is to blame. In a mixed gender environment, females felt more anxiety for fear of committing errors or being teased by the males (Cooper, 2006). Therefore, using the computer alone or in a female-only environment reduced anxiety and enhanced performance (Cooper, 2006). Because females excel in socializing, learning with peers appears to be more beneficial than learning alone. Therefore, a collaborative learning environment is favorable for learning and using the computer and Internet.

Canadian boomer women can use mobile technologies to enhance learning. In 2014, only 21% of SD users were 55 years or older, while 73% were 18-54 ("Canada digital future in focus," 2015). Because females are stereotyped to be computer incompetent, older Canadian women do not use the computer and Internet as much as younger Canadian men and do not take full advantage of mobile collaborative learning ("2010 Canada digital year in review," 2011, Cooper, 2006; He & Freeman, 2010; Selwyn, 2007; Wagner et al., 2010). Exactly how female baby boomers use SDs is unclear.

The double digital divide that dissuades computer use in female and older learners is due to stereotyping. Older women experience decreased cognitive abilities, diminished

computer self-efficacy, and increased computer anxiety, which are major deterrents for computer use. Practice improves performance and confidence and expands the knowledge base (Cooper, 2006). Ample time, peer collaboration, and a relaxing and supportive environment promote success and enjoyment, which in turn enhances performance. In fact, a motivated female can always out-perform her male counterpart (He & Freeman, 2010). Ability is not as important as state of mind. Female boomers should be more confident in their computer competencies.

Implications

Additional information is needed to promote mobile collaborative learning among female boomer students. A phenomenological study may reveal how well the women are adopting the technology. The results may suggest an intervention, for instance, a course which promotes the awareness and computer competence to the boomer women students for engaging in mobile collaborative learning.

The purpose of this project is to improve the learning experience in the female boomers studying at a university. As mentioned before, boomer women are a potential source of workers to relieve the labor shortage. Furthermore, Canada benefits from having well-educated citizens. Ultimately, improving boomer women's education contributes to the Canadian economy and effects positive social change.

Summary

Aging and commitments present challenges to boomer women students in higher education. Boomers face some barriers that hinder success, and this is consistent with the fact that nontraditional students have lower degree completion rates than their school-

aged counterparts (Taniguchi & Kaufman, 2005; Zhang & Palameta, 2006). The traditional gender role demands a woman's time and energy, especially if family and peers do not offer support. In this literature review, I discussed the effects of cognitive and physical aging and suggested compensatory practices. I found that female boomer students could incorporate mobile collaborative learning into their busy schedules, while peers support each other and share the study load. Because older women underuse technologies, an investigation to describe this phenomenon in female boomer students is necessary.

These following questions may lead to some understanding of the underuse of mobile collaborative learning in this group. How well do the female boomer students at a university adopt mobile collaborative learning? How do the adopters use the technology? If they do not use the technology, why not? The exploratory nature suggests qualitative research is appropriate. The methodology for this research is discussed in the next section.

Section 2: The Methodology

While there are many facets to female boomer learners, this study was focused on their mobile collaborative learning. I explored the following research questions: How do study group members describe their experiences with mobile collaborative learning? What are their attitudes towards learning with an SD? What barriers to using mobile technology do study group members describe? The purpose of this study was to explore the experiences of underusing mobile collaborative learning in female boomer students. I found that an intervention would be useful to promote mobile collaborative learning in female boomer students.

Qualitative Design

Because the purpose of this research was to explore the experience of underusing mobile collaborative learning, a qualitative research design was appropriate (Creswell, 2008; Lodico, Spaulding, & Voegtle, 2010; Merriam, 2009). A phenomenological research was most relevant because the objective was to investigate the essence of experiences (Creswell, 2009; Lodico et al., 2010; Merriam, 2009). Following the tradition of phenomenological research, the primary method of data collection was a long interview (Creswell, 2008; Lodico et al., 2010; Merriam, 2009; Moustakas, 1994).

Because I have studied at the same university as the participants, there was adequate immersion (Lodico et al., 2010; Merriam, 2009). The research was guided by ethical guidelines approved and monitored by the Institutional Review Board (IRB). I designed an interview protocol for data acquisition (Lodico et al., 2010). Data were collected and analyzed concurrently as described by the Modified Stevick-Colaizzi-Keen

method (Moustakas, 1994). I used a software package named Nvivo 9 for data management and analysis (QSR International, n.d.). The research was conducted to maintain credibility, dependability, and transferability (Lodico et al., 2010).

Phenomenological Research

I designed the current study to address a lack of research. The objective of phenomenological research is to construct meanings from the lived experiences of individuals who are involved in the phenomenon (Creswell, 2009; Lodico et al., 2010; Merriam, 2009; Moustakas, 1994). In the current study, female boomers shared their experiences with collaborative learning using SDs. Other research methods were considered, but phenomenological research was a compatible approach with the purpose.

Other Research Methods

Case study and grounded theory. I considered other qualitative research methods, such as case study or grounded theory. A case study provides an in-depth and rich description of a bounded system (Creswell, 2009; Lodico et al., 2010; Merriam, 2009) and is generally based on the historical accounts or observations of one or a few selected participants (Creswell, 2009; Lodico et al., 2010; Merriam, 2009). However, the aim of the current research was to make meaning from the experiences of female boomer students rather than tracing the historical development of the phenomenon. Additionally, female boomer students are interspersed throughout diverse academic programs, meaning a pragmatic sample would include more than a few individuals. The unit of study was experience with SDs, which is not limited to a class of students, therefore, a case study was not suitable.

A grounded theory methodology is used to develop a theory from the data and analyses (Creswell, 2009; Lodico et al., 2010; Merriam, 2009), which was not my intention in this study. Because the aim was to investigate experience with mobile collaborative learning, I did not use grounded theory.

The quantitative approach. Quantitative research was not appropriate for the current study because the objective was exploration of obscure facts. The purpose of a quantitative approach is to test a hypothesis, based on existing knowledge, by presenting the evidence in numerical form (Lodico et al., 2010). The power in this approach is supported by a large sample and the researcher investigates specific variables (Creswell, 1998); however, variables important for mobile collaborative learning have not been identified. In the existing literature, many different populations are aggregated together, diluting the findings that apply to female boomers. Variables identified from the literature were not relevant for the research questions in this study and quantitative methods were too general for this study.

The Participants

Selecting participants. Participant selection in qualitative research is based on the characteristics of the individuals (Lodico et al., 2010). Phenomenological researchers use purposeful sampling techniques to recruit people who have experienced the same phenomenon and can communicate conscious experiences (Creswell, 1998).

Selection criteria for participants in the current study included the following. The student must be:

- a female baby boomer (born between 1946 and 1964),

- a current student at the research site or student who has studied at the university within the past 7 years,
- willing to sign a written consent to the study,
- willing to participate in a 1-hour long interview and potential follow-up sessions,
- willing to have the interview recorded,
- willing to reply to a short follow-up questionnaire, and
- willing to allow the interview to be used in my dissertation.

I was inclusive with the recruiting criteria because rich information could come from unexpected sources. I used snowballing to recruit current or past students and alumni, who contributed from different perspectives but were difficult to identify with other recruiting techniques (Creswell, 2008).

The recruitment process. There were two stages of recruitment: advertising and snowballing. An advertisement was posted three times on the student bulletin board; it briefly described the rationale, method, and inclusion criteria. Each time, a few people responded via the Walden University e-mail provided. At the beginning, I e-mailed a flyer to everyone who responded, together with a link to Doodle (an online scheduling app) for scheduling an interview. Unfortunately, three of the respondents were too young to participate. Eventually, three participants were recruited by this method.

I invited each participant to refer their friends and fellow students to enter the research (snowballing). They could do so by sharing the flyer (Appendix C). Some friends and colleagues also identified potential participants and shared the flyer.

Snowballing is also called network sampling (Lodico et al., 2010) or chain sampling (Merriam, 2009). This is a common method of purposeful sampling, where participants are asked to refer other participants by identifying individuals who would not have been included (Creswell, 2008; Lodico et al., 2010; Merriam, 2009). The snowballing method resulted in successfully recruiting four participants. A fifth person indicated her interest but did not participate because she did not fit the selection criteria.

I concluded recruitment, data collection, and data analysis upon data saturation with a total of eight participants. I based this decision upon research recommending data collection until saturation and that fewer participants were sufficient for a phenomenological study if the phenomenon is widespread (Guest, Bunce, & Johnson, 2006; Moustakas, 1994)

Six participants received a $25, in Canadian dollars, local coffee shop gift card as a token of appreciation at the time of interview. One participant declined the stipend. The amount was decided after consulting Phillips (2011), who argued that researchers should avoid exploitation of subjects by offering a fair minimum compensation. For Canadians, $25 cannot be considered a substantial amount. Because the average hourly wage for Ontario women was about $26, this amount appeared to be a fair incentive to encourage participation (Lodico et al., 2010; Statistics Canada, 2013).

Ethical Protection of Participants

The Walden University IRB approval (Study # 08-07-14-0163619) was sought before commencement of data collection to ensure research standards were met (IRB, 2016). The criteria included voluntary and informed participation and minimizing risk

and maximizing benefit to the participants and society. Participants' privacy was protected as mandated by the Walden IRB (IRB, 2016). Because the research population was current and past students, the university's Research Ethical Board approval (Protocol ID 30758) and an approval from the Provost's office was also obtained (Appendix D).

Informed consent. Every participant signed an informed consent form immediately before the interview commenced. A standard informed consent is usually adequate for covering most scenarios; however, due to the emergent nature of qualitative research, predicting every situation that may occur was impossible (Lodico et al., 2010). I supplied contact information for both me and the IRB in case of concerns or complaints.

Protection from harm. Because the current research did not involve any intervention, physical harm to participants was not expected; however, there was minimal risk of emotional stress during and/or after the interviews (Lodico et al., 2010). I was prepared to manage this adverse effect by listening with empathy, though researchers have indicated that participants are likely to find sharing their experiences valuable even if they were traumatic experiences (August & Tuten, 2008). Participants could skip any question asked during the interview, stop the interview, or quit the research at any time.

Participants' privacy. Participants' confidentiality and anonymity were protected. Detailed description of the participants and settings may disclose the identity of participants (Lodico et al., 2010), so I used an alias to identify each participant. Care was taken when deciding what information to divulge so that anonymity was preserved.

Data Collection

In phenomenological research, an interview is the primary method of collecting participants' descriptions of a phenomenon (Creswell, 1998; Merriam, 2009; Moustakas, 1994). The approach is appropriate because participants describe their experiences, which are not reproducible for observation (Merriam, 2009). Creswell (2008) alleged open-ended questions, which did not have predetermined responses, should be used in interviews because participants could reflect and communicate their experiences freely.

To ensure inclusion of any unexpected but relevant information, I conducted semi-structured interviews to keep the process flexible yet structured (Lodico et al., 2010; Merriam, 2009). I used probes, or follow-up questions, for clarification or further disclosure when appropriate (Lodico et al., 2010; Merriam, 2009).

For each participant, I collected three different sets of data for triangulation and for capturing data both before and after the interview itself. First, each participant supplied a visual communication such as a photo. Then, each participant attended an 1-hour long interview, where most data were generated. After the interview, each person answered a short reflective questionnaire. The possibility of ad hoc follow-ups was part of the research plan but was unnecessary.

Merriam (2009) stated that a pilot is invaluable for ensuring the interview questions yield a satisfactory outcome. Lodico et al. (2010) described a pilot study as a "dressed rehearsal" to establish the suitability of a survey. In general, the pilot is to ensure reliability and validity of self-developed instruments (Lodico et al., 2010).

While a pilot study was not conducted, a female boomer student at another university vetted the interview protocol and the reflective questionnaire. She provided opinions from a peer reviewer's perspective. The interview protocol and questionnaire were modified to integrate her recommendations.

Data

I asked participants' year of birth to confirm if they were baby boomers (born 1946-1964). Before the face-to-face interview, participants supplied an image that they considered relevant. It could be any pictorial artifact in either electronic or hardcopy format, which the participant was allowed to choose. This item added to triangulation (Lodico et al., 2010; Merriam, 2009; Miles & Huberman, 1994). The image served three functions: to observe whether digital communication was a natural choice for a participant, to act as an icebreaker to start the interview (Creswell, 2008), and to obtain perspectives from the participants by discussing the context of the image.

Long interviews are the traditional data collection method in phenomenological research (Creswell, 1998; Moustakas, 1994). The interviews were semi-structured, featuring a few guiding questions to cover the basic research questions. These questions were e-mailed to participants 2 to 7 days prior to the interview, which allowed participants to contemplate their responses and reduce anxiety (Chang & Read, 2008). Furthermore, more details would be obtained when the participants had adequate time to consider the responses. A few participants came with written notes they had prepared for the interview.

There was a slight risk of obtaining false information by allowing the participant to think ahead of time (Lancaster, Vrij, Hope, & Waller, 2013). But success of field work relies on trust and the relationship between the researcher and the participants (Lodico et al., 2010; Merriam, 2009). I was responsible for validating the information. For instance, if a participant described herself as computer savvy, she would most likely use some computer terminology during the interview.

After the meeting, I e-mailed a questionnaire to each participant. The questionnaire provided a chance to reflect and supply additional data. A few questions were formatted into a Likert scale. Although this was not a quantitative study, it prompted the respondents to reflect on their experience during the interview. The participant chose to answer the questionnaire on paper or electronically. The paper questionnaire was an attachment, which a participant printed out, answered, and then faxed to me. Participants who chose to respond electronically used the link to answer online through SurveyMonkey. This also assessed whether participants preferred online or conventional methods. Participants submitted answers within 2 weeks after the interview. This allowed participants to reflect but avoided memory loss over time.

Interview Protocol

An interview protocol (Appendix E) was constructed to guide the interview (see Lodico et al., 2010). The protocol started with a heading, which included general information such as the date and time of interview (see Lodico et al., 2010). I first described the objectives, participants' rights, and recording procedure (see Creswell, 2009). At the end, I invited the participant to refer other individuals to participate in the

research. The protocol was concluded with a thank you statement (see Creswell, 2008, 2009).

The Interview

Lodico et al. (2010) stated qualitative research should occur in a naturalistic environment, protected from distractions, and where privacy could be preserved. The interviews were audiotaped. I guided the interview to ensure the conversation adhered to the area of interest (Creswell, 1998). I jotted keywords, observations, and my thoughts during the interview, which I have incorporated into the data analysis. Interviews lasted about 1 hour except for two interviews. The epoche was slightly shorter, probably because there was no conversation and the information was preplanned. All necessary items were covered during the interviews, minimizing the need for a follow-up or repeat interview.

In the interviews, participants recalled their experiences and were encouraged to disclose their feelings in relation to their stories. I used the phenomenological approach to make meaning of these lived experiences from both explicit facts and implicit consciousness (Creswell, 1998).

The System for Keeping Track of Data and Emerging Understandings

Audiotape recordings of interviews were transcribed into word documents and stored on my computer. I backed up all records regularly. Participants' names did not appear in any of these files; I assigned a unique participant number and alias to each person to keep track of the data.

In qualitative research, the researcher repeatedly reviews and makes note of any emerging ideas (Creswell, 2009; Lodico et al., 2010; Merriam, 2009; Moustakas, 1994). I kept all the documents in Nvivo 9. The program can import different forms of media such as images, audio and video files, and PDF files.

The Role of the Researcher

Being a baby boomer, I shared the same desires, experience, and challenges as the participants. I have witnessed the effects of double digital divide. I heard other boomer women's dismay for feeling inadequate when they use the computer or Internet. Thus, I wanted to learn about other women's perceptions.

Contrary to the quantitative researchers who distance themselves from the participants and the research question, the qualitative researcher is participatory (Lodico et al., 2010; Merriam, 2009; Moustakas, 1994). The phenomenological discipline using Modified Stevick-Colaizzi-Keen method dictates that the researcher will be one of the participants and the other participants are co-researchers (Creswell, 1998).

Special Data Management Techniques Used in Phenomenological Research

The tradition of transcendental phenomenology includes three steps to investigate and make meaning of experiences. In this context transcendental means examining the phenomenon with a fresh eye and open mind, resulting in acquiring new knowledge derived from the essence of experiences (Moustakas, 1994). Initially, *epoche* allowed me to disclose my own experience and feelings (Merriam, 2009; Moustakas, 1994). The opportunity to examine my experiences was essential to avoid judgment and biases later during the course of research (Merriam, 2009; Moustakas, 1994). Then, *transcendental-*

phenomenological reduction was used to describe the essences of the phenomenon (Moustakas, 1994). Data collected included perceptions and feelings about the phenomenon. Lastly, *imaginative variation* was used to deduce the structural essence of experiences (Moustakas, 1994). Through these steps, the *noema* (phenomenon) and the *noesis* (meanings) of the research question were recorded and analyzed simultaneously (Moustakas, 1994). The outcome was a description of the boomer women's experiences of mobile collaborative learning. This method emphasized subjectivity. Knowledge was constructed by systematically collecting and analyzing the participants' experiences and feelings, making meanings through discourse (Moustakas, 1994).

Moustakas (1994) stated that epoche was an important process in phenomenological research, which prepared a researcher by eliminating judgment and prejudice, improving awareness, and increasing inclusiveness (Moustakas, 1994). Additionally, epoche was also a meditation process through which the researcher recognized and discarded any predispositions (Moustakas, 1994). Then, the researcher would be able to view the research question from a fresh vantage point as if seeing the phenomenon for the first time (Moustakas, 1994). Only after epoche, would the researcher be ready to analyze other participants' perceptions without incurring the researcher's bias that could jeopardize the study.

Before data collection commenced, I practiced epoche (Creswell, 1998; Merriam, 2009; Moustakas, 1994). I described my own experiences with mobile collaborative learning and analyzed the data immediately (Moustakas, 1994). The subsequent data

collection process resulted in every participant describing the same phenomenon from different perspectives (Moustakas, 1994).

Data Analysis

In a qualitative research, data are analyzed and collected simultaneously (Creswell, 2008; Creswell, 2009; Lodico et al., 2010; Merriam, 2009; Moustakas, 1994). The vast amount of data is generated by open-ended, multimedia materials such as audio files, images, and text such as field notes and transcripts (Creswell, 2008; Merriam, 2009). I used a student version of Nvivo 9 to manage and analyze the data.

Software Used

The software package Nvivo 9 was used throughout the research. With this software, I stored data in multimedia format (QSR international homepage, n.d.). I coded data segments into nodes and then organized them into themes. Also, I created queries to examine the coded data and exported the results to Excel files for further manipulation.

Procedures of Qualitative Analysis

Qualitative analysis is an inductive process. The following are steps in qualitative analysis as described in textbooks (Creswell, 2009; Lodico et al., 2010; Merriam, 2009).

1. Collect data.
2. Prepare data: Prepare data for analysis, for instance, transcribe interview verbatim.
3. Code data: Identify meaningful segments from the material.
4. Synthesize data: Analyze and group segments into categories with analytical coding.

5. Repeat the above processes; obtain more categories from more data sets.
6. Combine categories into themes.

After careful review and reflection, the researcher compiles the categories and subcategories into major and minor themes. The themes are concepts or hypotheses that need to be tested and confirmed. If disparity occurs, the researcher can modify the hypotheses and repeat the verification processes. At this stage, the analytical process has become deductive. Figure 3 describes stages of a qualitative analysis as described by Creswell (2009), Lodico et al. (2010), and Merriam (2009).

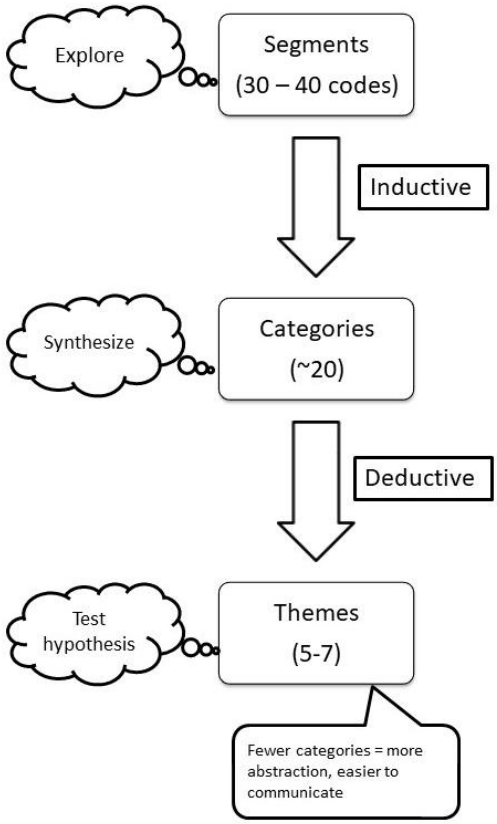


Figure 3. The qualitative data analysis process and the transition from induction to deduction

Modified Stevick-Colaizzi-Keen Method

Moustakas (1994) described the Modified Stevick-Colaizzi-Keen and *Modified Van Kaam* methods for data analysis in phenomenological research. These two methods are similar in procedure and employ similar techniques, such as phenomenological reduction and imaginative variation (Moustakas, 1994). In the former method, the researcher is the first participant to contribute to the research (Moustakas, 1994).

I chose the Modified Stevick-Colaizzi-Keen method because my profile fitted the sampling criteria, and the question under investigation was my personal passion. It was emotionally important for me to be able to share my own experience. Besides bringing my feelings into perspective, epoche strengthened the sense of ownership of the project. Furthermore, the Modified Stevick-Colaizzi-Keen method is more popular among researchers (Creswell, 1998). The Modified Van Kaam method is apparently used only when the researcher cannot be included in the sample (Forber-Pratt, Aragon, & Espelage, 2013; Machtmes et al., 2009; Siwe, Wijma, & Bertero, 2006).

The process entailed phenomenological reduction, which included bracketing, horizontalizing, organizing invariant qualities and themes, and constructing textural description (Merriam, 2009; Moustakas, 1994). In this method, data analysis commenced as soon as the first set of data is available. The first set of data was my experience (epoche). The use of *horizontalization* assigned equal value to each statement that represented a segment of meaning (Merriam, 2009; Moustakas, 1994). I clustered the segments into themes, which I synthesized into a description of the texture (the what).

Then, I examined the textural description from different perspectives (imaginative variation) to arrive at a description of the structure (the how). A *textural-structural description* that emerged represented the meaning and essence of the experience (Creswell, 1998; Moustakas, 1994). A textural-structural description was generated for each participant by repeating the above steps. The descriptions were integrated into a universal description of group experience (Moustakas, 1994). Figure 4 illustrates this approach.

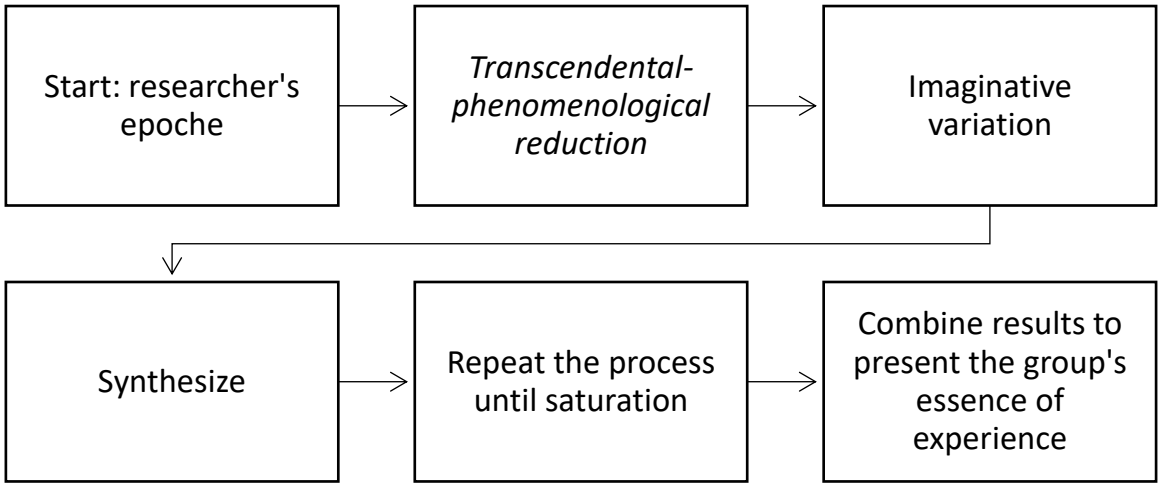


Figure 4. A summary of the Modified Stevick-Colaizzi-Keen method. Adapted from *Phenomenological research methods* (p. 121 – 2), by C. E. Moustakas, 1994, Thousand Oaks, Calif.: Sage. Copyright 1994 by Sage Publications, Inc.

Results

In qualitative research, the researcher is the instrument. Due to the participatory nature, absolute objectivity is impossible to achieve. The epoche was an important step to prime me for data collection and analyses with minimum biases. I strived to support

my interpretations with evidence, and employed methods (discussed below) to ensure the quality of the current research.

The Participants

The first set of data, as planned, was my epoche. Then, between August 2015 and February 2016, I recorded seven interviews. Because saturation was achieved early in the research, I introduced participants outside of the original sample. This strategy maximized variation, which would enhance transferability in qualitative research (Merriam, 2009). Because the results were similar in all participants, saturation had been attained.

The population in Toronto consists of a diverse mix of ethnicities, religions, languages, socioeconomic status, and lifestyles (City of Toronto, 2017). I did not enquire about each participant's ethnicity because it was not relevant to the research; however, some participants did mention their family and experiences in other countries. I identified an African, two Asian, one South Asian, and a European participant by observing their appearance and accent.

The aliases of the eight participants were *Amy*, *Beth*, *Carol*, *Daisy*, *Ellen*, *Flora*, *Grace*, and *Hilda*. The aliases were chosen from ten pre-printed participant cards. Care was taken to eliminate aliases similar to the participants' first and last names. Then, a card was drawn randomly for each alias assignment.

Most of the participants I interviewed had completed their undergraduate degrees. They pursued education to update their knowledge, principally for career enhancement.

Therefore, many participants studied in the advanced or graduate levels. Some areas of interest were public affairs, policies, health management, and religious studies.

All participants were female. One person was slightly older than the typical baby boomer, being born in 1943. The other seven participants were born between 1954 and 1962. Two were current students and four were past students or graduates. Only two participants were unemployed. One participant was on the staff while another was a student at a different university; however, both proved to be rich informants. Their perspectives were slightly different from the other participants' because they did not study at the same university; still, all analyses yielded the same categories and themes.

The Data

As soon as the first set of data (epoche) was obtained, I started analyzing data. I aimed to answer the research questions, which were: How did female baby boomers describe experiences with mobile collaborative learning? What was their attitude towards learning with an SD? What were the barriers that prevented them from using mobile collaborative learning?

During the interviews, I could not differentiate and isolate ideas of mobile collaborative learning from the participants' discussions about the use of the computer, collaborations, and mobile technologies. In other words, they extensively discussed related topics, which may or may not be directly related to mobile collaborative learning. Still, the interviews yielded many valuable findings that deserved attention.

Findings

The following is a report of the findings, supported by quotes from participants. Data showed that most participants had some experience with but inadequate knowledge of mobile collaborative learning, while all participants felt positive about the technologies. Also, participants identified several barriers that hindered technology adoption.

Themes

Table 1 presents major and minor themes that emerged after data analysis. The themes are organized to answer each research question.

Table 1

Summary of Themes

Research questions	Major themes	Minor themes
1. How do female baby boomers describe experiences with mobile collaborative?	• Experience with and opinions about technologies	• Use of mobile technologies • Cloud computing and online banking • Experience collaborating
2. What are their attitudes towards learning with a smart device?	• Experience with and opinions about mobile collaboration	• Collaborative platforms or software • Experience with and opinions about social media
3. What perceived barriers prevented female baby boomers from using mobile technology?	• Change process • Security concerns • Effects of age and gender • Computer training	

Research Question 1: Experiences with Mobile Collaborative Learning

The main themes in this section were participants' experiences with and opinions about technologies. While all participants used mobile technologies and experienced collaboration, they had limited experience with cloud computing.

Every participant used the computer daily. For instance, Amy used technologies to assist with her daily tasks. "Research, I do a lot of research here. I do policy work, so I do legislation and regulation, so I'm always doing research on that to see what other jurisdictions have." Besides her day-to-day work, Amy also used the computer for her charity work, family matters, and entertainment.

Because Amy considered computer skills crucial, she required early computer education for her children. Due to rapid technological advances, Amy knew updated computer knowledge was essential both personally and professionally. Likewise, Beth learned computer skills in both the formal and informal settings, such as *massive open online courses* (MOOCs) at Coursera.

Being an early adopter of the computer, Beth was comfortable with technologies. She ascribed it to experience. Although an expert user, she was also challenged to keep up with the fast-paced, ever-changing technologies. "I get stymied every so often with things I didn't know coz I don't bother reading the manual especially if it doesn't come with a manual like they used to." Sometimes, Beth had difficulty navigating through the mountains of data on her devices and retrieving files from her collection.

At work, Carol relied on the computer and the Internet to accomplish her tasks.

> But if you tell me to write a letter, a business letter, writing it, I can't do it anymore. I need to do it only on the computer . . . if there's no power, no Internet, everything is at a standstill at work.

Therefore, Carol found computer skills useful in the workplace. "If a person who really doesn't know how to use a computer, they might not land on a job." Also, Carol considered travel a form of education and found the Internet indispensable for planning her vacations. She collaborated with her friends when they planned their trips, and they often did so online.

Use of Mobile Technologies

Almost every participant used mobile technologies to some extent. Instead of hesitating and searching for the buttons, Amy's confident touch demonstrated that she was comfortable using her smartphone. Beth used Polar, a wearable technology that connected to a smartphone, to monitor her workouts. Ellen enjoyed the freedom while using the Internet, where she could defy geographic barriers. Frequently, Ellen used mobile Internet for her studies and personal life.

Meanwhile, nurse educator Flora used the iPad to deliver PowerPoint presentations, share presentations and images, play Bridge, and read digital books. For reading, Flora also used a Kindle. Flora found that digital books were slightly less expensive than their paper version. Also, a device could save many books, which saved space and was more portable than paper books.

When Daisy interacted with people, she found mobile devices intrusive. She expressed disapproval that even when people met, some preferred text to chat. Some

people became so addicted that Carol feared their communication skills might degrade. She observed that young people were attached to their mobile devices and stayed online constantly. Several participants admitted they were addicted to mobile technologies. While Flora found technologies addictive, Amy kept the urge in check. Hilda played games on Facebook but stopped because she thought games were addictive and time-consuming.

Apparently, Beth was slightly addicted to her smartphone because she could not part with it even at bedtime. She was frequently overwhelmed by the amount of information that reached her every day. She was distracted by the hyperlinks, extended readings, e-mails, and the pursuit of information validity. These distractions could take her hours astray from her schedules.

According to Carol, mobile technologies could improve productivity. With a smartphone, she could respond to e-mails and troubleshoot work problems without delay. Even when she was away from the office, she could still use a mobile device to obtain information such as traffic and weather. On the other hand, Carol mentioned a professor who did not have a cellphone and explained it was a personal choice and a matter of change management when deciding on employing mobile technologies. All in all, she had a positive attitude. "Technology is plus." Carol was planning to purchase a smartphone and enjoy using the technology after that, "I have to upgrade . . . I think so, I think the way the world is going . . . And everything is online." Carol did not elaborate why she had not acted yet; however, it was likely that she had already become familiar

with her children's SDs. Because Carol's son was a computer engineer, she would have support whenever needed.

Beth observed that many Internet users were unable to appraise the credibility of web content. "Well, it's on Wikipedia, it must be true; says it right there on the computer, my friend sent it to me, it's true." That annoyed Beth because she found these people gullible. Carol mentioned that she had to filter the contents on the web because users were presented with irrelevant information. "You get lots of junk on it . . . It's up to you . . . how to filter it." She was comfortable with appraising content found on the Internet. Grace was also diligent with appraising content on the websites. She often used websites recommended by her lecturer or fellow students. When in doubt, she would consult her peers because she trusted their judgment. In addition, she would also research the publishing organizations to assess the legitimacy of the information these groups provided.

Cloud Computing and Online Banking

Although a cloud user, Beth did not trust the technology, with one exception. Beth used app-based banking because she was confident of its security. Amy commented, "That is the absolute best thing that ever happened." Ellen, Grace, and Hilda also used online banking.

Also, Beth used the cloud for communicating between different devices. She found cloud computing useful when she needed to access e-mails from different locations using different devices. Beth archived everything locally because she was wary of the costs incurred if she depended on the cloud.

While many people use the cloud, it is still mysterious to them. Despite her interest in sharing and editing documents on the cloud, Flora had limited experience. Although Grace recognized the convenience of cloud computing, she did not upload personal information due to security concerns. Infrequently, Grace downloaded and presented PowerPoint files. She had Dropbox, iCloud, and OneDrive accounts. "Those are like an Internet storage, I can get stuff outright." Due to lack of experience, she felt safer sending a file via e-mail instead of sharing them on the cloud.

Experience Collaborating

All the participants had some experience in collaborative learning, though not everyone used mobile technologies. They also discussed collaboration in the workplace.

When Ellen studied at the university, she reached out to fellow students for collaboration because she felt isolated. Daisy, on the other hand, opted for collaborating at work but learning alone when working on hobbies. Amy enjoyed collaborating because she welcomed the sociability of conversations; however, collaboration decreased the efficiency that Amy valued. Comments and debates disrupted the flow of ideas, and compromises were inevitable in-group work. Thus, Amy preferred to be alone when she needed to concentrate.

Flora regarded communication skills essential because, in reality, people work in groups. Flora called it *the spirit of collaboration*:

> The communication skills that arise from working in a group are fabulous, and it prepares you for the real world. I mean the real world, every workplace, you are working in groups . . . and you know people are at different levels of ability in

terms of collaboration, again, that's great. They learn, too, and they develop.

Again, you just learn to trust the spirit of collaboration.

Through collaboration, people pooled their knowledge and experiences from different sources, which represented different levels and facets of the question at hand. Although Carol thought group members should be accountable for their tasks, she preferred collaborating to working in isolation.

On the other hand, Beth preferred to study alone because she did not want to depend on group members to complete the assignments. While group work did not bother Beth, she was annoyed if certain members did not contribute to the team. Incidentally, Hilda also found working with others stressful and ineffective because there were too many opinions. However, Hilda did not mind collaborating because she enjoyed working with a good team. Moreover, Carol maintained a good rapport with her peers, which she found was the basis for collaboration and support. Although Grace enjoyed learning with her peers, she resented when people "switch channels" midway during the discussions. She would then assume a leadership role and redirect them back on track. Although Grace recognized the convenience and efficiency of sharing and editing online, she did not have much experience.

A successful collaboration, Grace described, was when team members took possession of the project. Together, they worked on conferring on all aspects of the project. Members complemented each other for achieving a storyboard-type framework, upon which they assembled the final product. The main ingredients for a successful

collaboration were trust, respect, honesty, courtesy, and openness, which resulted in a harmonious atmosphere.

Instead of criticizing, teammates asked politely for elaboration and explanation of any ambiguities. On the other hand, a collaboration would sometimes fail. "If anyone in the group started to criticize or to try to put down people's idea, I think that created a dilemma, and that would break respect and trust within the group. That would be very fatal." Grace thought criticism and confrontation were culprits for damaging harmony.

During an extraordinary collaboration, Flora met people who demonstrated high-level communication and decision-making skills. On the other hand, she remembered people dreaded the idea of group work, especially student nurses who worked variable shifts.

In Hilda's experience, a good team emerged when members supported and respected each other. Teammates could share their experiences, even frustrations. Members of a team shared the workload, ensuring not one person carried too much burden. "A good team is when we're working together and everybody is very encouraging . . . they don't place too much of the responsibility on one person." A bad team was just the opposite. Teammates became unsupportive, inconsiderate, and defensive. The situation could become combative.

Collaboration could result in a better product. Daisy explained, "But some people did end up making comments, or did make contributions which I wouldn't have thought of. So, I did see the value in working with other people." In Carol's opinion, the people on the team were a determining factor in the success of teamwork. Each member should

contribute equally and bring their specific skill sets to the team. A non-contributing member inflicted a tremendous load on the others and caused resentment.

Research Question 2: Attitude toward Mobile Collaborative Learning

All participants showed a positive attitude toward mobile collaborative learning. Among the variety of apps, everyone used e-mail and Facebook. Some participants were inactive in social media due to privacy concerns. Despite their experience, participants were incapable of leading the use of mobile technologies.

While Flora found advantages in both the online or face-to-face learning, she did not prefer one over another. Instantaneous interactions would occur in a live classroom. Both verbal and nonverbal communications could be exchanged freely, while decision-making and progress would be efficient. Instead, members could contemplate before responding to asynchronous discussions, which resulted in excellent responses. Granted, Flora would strive for even higher quality effects when she received rich responses from her peers.

When Amy attended hybrid courses, students met in either online or face-to-face classes. She enjoyed online discussions because there was less distraction to the main event. “That's always a nice quick way to do it you know, and it's without interrupting people's trains of thought, or presentation, or whatever.” However, Amy also enjoyed face-to-face discussions. “When you're with a group, it's always good too, because you can have open dialog, which is all nice but it may not be as streamlined as sometimes as online.” While Daisy found both formats valuable, she had a unique experience when

she attended a blended course. Due to the online interaction, the bonding between participants lasted well after the course concluded.

Online collaborative learning brings people from different locations and all walks of life together because they are not constrained by place and time. With online learning, Beth overcame geographic barriers and scheduling problems, which enabled seamless learning even during vacations. The Internet made inter-professional collaborative learning more feasible.

Collaborative Platforms or Software

Every participant used e-mail. E-mail was the primary communication tool among seniors because it has been available for decades; however, the lack of netiquette bothered Beth. While Amy thought communicating with specific people or groups using e-mail could safeguard privacy, Daisy found that e-mail was not a good method to use for collaboration due to difficulties in tracking different versions of the final product.

Participants mentioned many methods for collaboration, and their experiences were diverse. Some participants were experienced with different forms of collaborative software while others were not. Participants used the following software: Blackboard, Google Apps (such as Google Doc, Google drive, and Hangout), SharePoint, Doodle, Dropbox, Evernote, GoToMeeting, PowerPoint, Skype, Text, Trello, and YouTube. Most of the software had mobile versions while some were exclusively mobile apps.

The groups' preferences usually dictated which platforms to use. Amy commented, “Even though you want to do it, sometimes you have to still go to the lowest common denominator to ensure that if you're working on a project things are at a certain

point in time." Amy found many useful features in SharePoint, such as version control, comments, and tracking changes. Many users could edit the same document simultaneously. SharePoint was particularly useful for managing large documents in large-scale projects.

Beth used Google Doc and stated:

> The technology has made it easier to collaborate . . . you can actually put things together, plus you can actually communicate on the Internet at the same time . . . you can do that much easier with the technology than you used to.

Hilda used Google Apps to collaborate online. "So, I think it's a wonderful thing. Everybody can see what you're doing. Everybody can see what the other person is doing. I think that's a great way to collaborate." Some participants also collaborated with videos.

The video is a useful educational tool (Multisilta, 2014). Grace found YouTube superb for instructions and demonstrations. YouTube was an excellent platform for mobile collaborative learning because video demonstrations could be communicated effectively. With more experience, Grace endeavored to produce and upload videos. Meanwhile, sharing videos with fellow students was an effective means of collaborative learning.

Even though Grace found Hangout useful, the group could improve on the video and audio qualities if they had adequate resources. Hangout enhanced inclusiveness: "But at least I'm participating in the meeting . . . some members are sick at home, then

they can still participate in the meeting." Similarly, Hilda also used Hangout to communicate with her peers.

Although Ellen used many apps that she could share with the others, there were no peers to collaborate with her. She felt isolated and frustrated. While many participants collaborated online, most of them implied that they did not lead or initialize the adoption of mobile technologies. Some participants indicated they were not proficient with the apps although they used them.

Experience with and Opinions about Social Media

Every participant used Facebook. Other popular apps were Twitter, LinkedIn, Skype, and WhatsApp. Participants also mentioned FaceTime, Flickr, Google Plus, Hangout, Instagram, Line, Meetups, Pinterest, Snapchat, Tumblr, Viber, WeChat, WordPress, and YouTube.

While some participants were active in social media, a few were at the receiving end of the spectrum, reading content but rarely posting. Security and privacy concerns dissuaded many participants. Although most social media support asynchronous communications, so busy people can stay connected, Amy still found it time-consuming.

Many participants mentioned the multigenerational function of social media for bringing people of different ages together. Amy felt using social media was necessary to belong to a contemporary group. "I want to make sure that I'm at the same level as my colleagues, regardless of what their age. So that's, that's sort of like an incentive to me to make sure that I don't fall behind." Flora also suggested Facebook connected different generations. "Now, the conversation can happen via social media. It's a wonderful

opportunity for engaging with young people." She found it useful for connecting with family and past colleagues. In fact, Flora found that social media expanded her social circle. Because people shared posts from their networks, Flora's access to a vast source of information was effectively extended. Hilda connected with every family member, several of whom resided in different parts of the world, on Facebook. "We say 'hi' to each other or let everybody know wherever we are." With Facebook, Hilda could overcome geographic barriers and time zone differences.

In addition, Beth thought Facebook was perfect for broadcasting. With Twitter, headlines depict developing stories in almost real-time. She kept herself current with Twitter by following tweets from news media. Flora recognized the instantaneity and the brevity that Twitter provided. She was following the New York Times on Twitter for quick updates.

With the press of a button, Flora and Grace could connect with family and friends with FaceTime. FaceTime is available to Apple users on a one-on-one video chat. Grace also used Hangout, WeChat, and WhatsApp. WeChat and WhatsApp are two cross-platform messaging services for smartphone users (Tencent, 2016; WhatsApp, 2015). While WeChat is ubiquitous among Chinese users, WhatsApp is achieving worldwide popularity. Both apps support multimedia and instant connection between individuals and groups. The Internet is particularly useful for connecting people from different countries. Lastly, Carol found Meetups, an online social networking portal, an excellent way to get acquainted with people having mutual interests.

With social media, privacy was a challenge. For instance, Amy asked her daughter to refrain from posting too many photos of her grandchildren. On the other hand, long-lost friends re-established contact with Amy using Facebook's private message. Because of privacy considerations, Beth would not post travel photos during her absence. "I don't send travel pictures while on the way. It's nobody's business that my home is empty." However, both Beth and Carol would share the pictures on social media after they returned home.

Still, Carol noticed that she had to compromise some privacy by accepting cookies: "Nothing is private." Carol valued her privacy, but recognized other people felt differently. For instance, Carol's friend posted their photos when they had dinner in a foreign country while Carol wished she had not done so.

Participants should improve on privacy literacy, especially the ability to adjust settings (Park & Jang, 2014). In the current research, some participants responded to the privacy threat by limiting online activities. No participant discussed privacy settings in social media except Hilda mentioned she would block people whom she found posting irrelevant or uninteresting content.

Research Question 3: Perceived Barriers

Participants highlighted fear of change and fear of learning new skills as two major obstacles to mobile collaborative learning. Most of the participants' opinions aligned with the literature, such as technical problems, security, and anxiety as major deterrents to adoption. All participants agreed that aging dissuaded seniors; however,

they had different experiences and opinions of being female computer users. Below are detailed accounts of the topic.

The change process. The reluctance to adopt new technologies appeared to be the biggest obstacle. Flora considered adopting technology as a change process in which people needed to step out from their comfort zones. For example, Flora became nervous when she switched from a Blackberry to an iPhone. Once familiarized with it, she was fascinated by the iPhone's intuitive interface.

Grace advocated that people should maintain a learning mode to match the fast-changing world. She heard many friends complaining about the frequent smartphone updates.

> Oh, you know what? I don't want to update the software, because once I updated, it can be a little bit different from what I'm used to . . . People kind of scared or are being stressed . . . sometimes they feel stressed that they have to learn so much, in a short period of time.

Due to the rapid changes, users encountered errors and warning messages frequently, which Grace found annoying. Recently, Amy moved to a new position. She took a positive approach to change, which included keeping herself current with technologies. Amy highlighted that people had to keep pace with changes to be competent in their jobs.

Ellen suggested the biggest hindrance to using technologies was the lack of interest to learn something new. Flora admitted, "The fear factor stalled me . . . But once I started doing it, it was fantastic. It was easy." Once they tried, they found there was no reason to feel nervous at all.

Still, Beth observed that trying new things was a real challenge to many people, especially older adults.

> The technology changes every time you turn around so it becomes kinda scary when you're an older person, like really old and learning new things is hard . . . And so learning something that is so alien at that point becomes really difficult.

In the quote, Beth was referring to seniors in their 80s; however, data from the interviews indicated that it was also applicable to baby boomers.

Personality and lifestyle, according to Daisy, were influential factors for adopting technologies while challenges included awareness, security, technical problems, and time issues. Outside of the academia, people might have different goals and means for communicating. "That's different because not everybody is into school, you know? . . . . so their use of an access to that is different." Although implicit, Hilda implied education played a part in this.

In contrast, Carol thought lifestyle was a key determinant. A person would not use the computer if it were not a necessity, even though the person possessed the skills. Carol talked about a man and a woman, in their 70's to 80's, who had no computer knowledge. The probable reason was they did not need a computer. Carol mentioned two female baby boomers who did not use the computer. One person worked as a personal support worker while the other was out of the workforce due to health issues. They had the computer skills, but they did not need to use them.

Some of Amy's peers felt awkward when asked to use the cloud and refused to try. Those who worked in technical professions were computer proficient while the

others were not. She presumed that technology adoption was job-related; however, Amy noticed some people failed to update their skills to current job requirements.

The challenge is particularly relevant for the pragmatic seniors because they need to see the advantages before they invest time and effort to adopt technologies (Wagner et al., 2010). Wagner et al. (2010) alleged seniors could benefit from mobile technologies. For instance, physically challenged individuals could enjoy enhanced independence by performing some tasks online, such as shopping for groceries. In sum, usefulness was an important factor for adoption.

Hindered by technical problems. Another barrier was the technical challenge. The occurrence or even the expectancy of technical difficulties discouraged boomers from using technologies. For instance, Grace felt irritated when the computer broke down in the middle of writing an assignment. It would seriously delay the schedule, and the desire to restore the computer swiftly made the troubleshooting process stressful. If her computer froze, Grace tried to troubleshoot problems. If she could not solve them, she would ask her friends for help. Her friends' advice worked in some circumstances, but not always.

Many computer users lack problem-solving skills. Technical difficulties such as login problems discouraged the use of technologies. As a result, participants would rather be a laggard than an early adopter.

Time issue. Several participants indicated they could not afford the time to explore mobile technologies. Although interested, Daisy did not feel that learning certain applications was necessary. “Well, I think learning about, you know, computers or those

kind of things, it seems, to me, quite a luxurious type of activity." Her priority was job-related computer skills.

Security Concerns

Some people were skeptical about new technologies, Ellen stated, while security was the main concern for others. Daisy suggested two levels of security problems. First, Internet security was a significant deterrent for her. Once posted online, the information became uncontrollable because any recipient could forward the material. Therefore, she barely used social media because she found them insecure.

To her dismay, Amy's Facebook account was hacked twice. The hack also affected her e-mail, which interconnected with many other accounts. Similarly, Beth almost fell prey to a scam e-mail. Changing and remembering passwords was irritating for Beth because passwords were too numerous to manage. Yet, she did not mention using apps to manage her passwords.

In contrast, Carol was meticulous about her accounts and passwords. "If your identity can be stolen, if you don't change your passwords, or you never know. Lots of things can happen." Carol changed her passwords frequently and put everything in a mega-password protected file. Still, she was concerned about losing her mobile devices together with information stored on them.

On the contrary, Hilda felt no need to be overanxious. Hilda did not like Gmail because she found the authentication procedures cumbersome. She preferred Yahoo apps for the ease of recovering information. For Hilda, Internet security was not a concern. She believed hackers were so powerful that it was pointless to attempt to evade a hack.

"I think you should be careful as much as you can be careful, but hackers don't care about your carefulness." Hilda stated people should not be over-anxious about Internet security. "Take care of yourself. Make sure you have good locks on your door, your windows are fine and all that . . . . But what are you going to lose sleep over your stuff? You pay insurance." According to Hilda, the level of security available was ineffective to safeguard against professional hackers or the government; either could gather any information they required. She thought paying for improved security was a waste of money.

Effects of Age and Gender

A literature search revealed a stereotype was the underlying reason older females underuse technologies ("2010 Canada digital year in review," 2011; Cooper, 2006; Czaja et al., 2006; Middleton et al., 2010; Wagner et al., 2010). The following describes participants' input on this topic.

Age. All participants agreed that older people were less competent with contemporary technologies. Beth, who had extensive experience with seniors, observed that most could perform basic computer functions such as e-mail and word processing. While many were unable to execute complex processes, some seniors found technologies foreign and scary. Several participants stated some people refused to learn when computers first appeared because they did not see the need. When the technology became an integral part of everyday life, some of them became disconnected because they missed the window to come onboard. At best, they could not use some online

services. At worst, they had to leave the workforce because they lacked the necessary computer skills.

According to Flora, the notion that older people were slow learners was ageism. She stated, “Once they’ve adapted and they learn about it, they’re off to the races.” Still, Flora found some seniors imposed this stigma on themselves, which dissuaded them from learning contemporary ways of living. She mentioned an example of an 88-year-old lady who was proficient using the Blackberry. Furthermore, Flora asserted this old lady was well-educated, which agreed with the literature that stated education was a positive predictive factor of using the computer. Amy also suggested that education attainment favored use of computers by seniors.

Computer anxiety in seniors. Daisy commented that computer anxiety could hinder seniors from learning the technology. Older computer users had to begin to learn unfamiliar technologies, which they sometimes found intimidating.

Success in troubleshooting or accomplishment of a challenging task boosted confidence. Sometimes, people underestimated themselves. Flora observed, “Again, we're always so quick to be self-deprecating, and I think that is symptomatic of our age group.” Grace thought the lack of knowledge and experience caused anxiety in older users. Also, older users were afraid they might make mistakes or break the device. When their performance was suboptimal, they became frustrated, which further discouraged them from using the computer.

Also, Hilda deemed young people the chief promoters for the use of technologies by seniors. Connecting with people at school using current technologies was not a

problem for Hilda. Hilda suggested intergenerational interaction was an important factor for adopting technologies for baby boomers. "But the intergenerational thing is important too, because they introduce you to the newer stuff." Although Amy would take a course or practice with a device, interest often sparked from interacting with her children or grandchildren. Young people introduced their elders to social media to stay in contact. Flora suggested Facebook connected different generations. "Now, the conversation can happen via social media. It's a wonderful opportunity for engaging with young people." When there was a need to connect, the seniors learned the skills.

User input and needs. To promote the use of technologies among the elderly, participants invariably suggested recognizing users' input and needs. They stated older people face challenges due to aging, such as dexterity, diminished eyesight, and arthritis. Beth alleged computer designers should recognize this need. She observed many seniors with arthritis found it difficult to work with hyperlinks. She advocated that product developers should involve end users as early as the planning stage. "So if you involve users as much as possible, involve seniors as much as possible, involve the people that it applies to, then you start making sense." Hilda also asserted that product developers should consult senior users and address their needs. "Older people . . . we're very big on thoughtfulness . . . . When you're going to create a product if you consider all the people, actually, who use these products and the different reasons why they would be attracted to your project." She explained that people in the industry should consult users at the planning stage because designers were usually younger, and their needs were different from those of older users.

Devices should feature large fonts and intuitive designs to facilitate use by older users. Other adaptations to physical aging should be an integration of the interfaces. Grace suggested devices should have improved voice recognition functions, allowing seniors who found it difficult to use the keyboard or touchpad to execute with voice commands. Alternatively, the onscreen keyboard could increase in size. Flora thought the touch screen helped overcome some accessibility issues and Page (2014) supported the observation; however, Flora did not discuss the accessibility settings in SDs.

While participants associated accessibility with mobile devices, professionals considered it a software issue. In fact, the need for accessibility settings not only exists with the interface but also in mobile apps (Díaz-Bossini & Moreno, 2014). Díaz-Bossini and Moreno (2014) stated accessible contents were insufficient for the demand of senior users.

The computer industry should aim to develop user-friendly interfaces on devices that are sturdy and easy to use. The software must be secure and intuitive. Devices should be relatively trouble-free, maintenance-free, and capable of correcting themselves when problems emerge.

Gender. Participants had different perspectives about the gender-technology relationship. For instance, Amy thought there was no gender difference using and learning technologies. Flora and Amy mentioned salary gaps between genders. “We still don't earn as much as men in, in some instances, you know? And that's not right. You know, it’s still, it's still an ongoing issue.” Also, Flora described examples of gender inequity in Canadian society. For instance, some people thought women were less

intelligent, despite higher education attainment in women than men. Moreover, Flora argued women could adopt technology better than men. Additionally, Daisy stated that the male dominant science and technological world belittled female abilities. Meanwhile, Beth found the widespread gender stereotyping irritating. For instance, she noted that the girl versions of Lego carried themes of buying and selling, which were absent from boys' toys.

On the contrary, Ellen thought females of all ages have less computer confidence than their male counterparts. "I talk to younger females like my colleagues who are adults . . . They just don't feel they are good with computers and they will always turn to their husbands." Also, Grace observed women were less technology oriented than men and often tried to elude it. It was more apparent in old than young users.

The experience of stereotyping. Although Hilda seldom experienced the stereotype that devalued technology competence in older females, she observed that sometimes people thought she might not be interested in using technology. "And they don't assume that I don't know something. They find out." Granted, the university was inclusive for students of all ages and promoted an inclusive atmosphere.

Whereas Amy had not experienced prejudice due to her age or gender, she was proud that she showed more computer competency than expected. Amy asserted people should not be treated differently because of their age and gender.

> And by the same token, like, people will ask me about doing something and uh, sometimes I think some people are surprised that I know something . . . jobs don't

have gender base, they shouldn't, they should have skill set . . . you shouldn't be discriminated against by age either . . . or given an advantage because of age.

Although Beth disagreed that females were less competent with technologies than males when using the computer as a tool, she observed younger males excelled in gaming. Yet, Beth recognized it was hard to assess computer competency and prove women could be good at computers. For instance, should people be evaluated for their ability to code? Still, Beth exemplified use of mobile collaborative learning by older females because she harnessed the skills and enjoyed the convenience that contemporary life brought.

Usually, Carol did not experience stereotyping about middle-aged females and technology, except when Carol and her friends encountered technical difficulties reserving a tour through the Internet. Then they visited a travel agent, who helped them promptly. In retrospect, Carol thought the group might have appeared incompetent with booking their trip online. Still, the travel agent did not show any signs of disrespect.

Similarly, Grace did not experience this type of stereotype herself. "If I say I can't, then I can't, but I haven't come across anyone who pre-assume that I cannot do it." Grace's direct and focused approach might have dampened expressions of stereotypes among those who interacted with her. Granted, Grace thought people who presumed older females were not computer competent might have encountered users who had an inadequate knowledge or simply evaded the computer. She speculated that sometimes people generalize their own experience to others, thus presuming older females were inept computer users.

Although Ellen felt frustrated when people undermined her identity as a student and her computer competency, she still found that females and older people were less proficient. Flora thought older females were equally competent as other computer users. After experiencing some first-hand stereotyping, she stated, "Yeah, not fair . . . nobody likes to be treated like they are inadequate. People need to be respected, and using technology is only an example." Flora felt insulted when people presumed she could not use technologies because of her gender.

When Daisy was attending a computer course, she was bothered because both the teacher and students expressed negative stereotypical comments about older female learners. Some of them stereotyped older females as stupid because they could not understand the instructions:

> And someone actually asked the question, "Oh, what do you do about older people? How do you get them to be able to manage to do these things?" And, you know, it was kind of very negative stereotyping about people of my age.

Condemning stereotyping based on age or gender as unsound, Daisy alleged that older females could learn if they were taught with the appropriate instructional methods and language. In her discussion, Daisy mentioned a teacher disapproved of students forming groups and learning together.

Students who helped each other demonstrated a form of collaborative learning. It coincided with my hypothesis that older women learn more effectively when they group together and support each other emotionally and intellectually. The grouping in Daisy's example appeared to occur naturally out of necessity.

Promote adoption of technology. Being an early adopter was a positive reason for Beth to use technology. People needed to be willing to learn. "They have to be in a mental stage to wanna learn." Therefore, individuals who lagged behind might need to overcome specific challenges to start adopting technologies.

Awareness seemed to be the key. Daisy stated the main reason for not using technologies was a lack of awareness. Beth used a service offered by a university library website as an example. Inexperienced users might overlook its icon due to lack of promotion. Hilda thought two important factors for adopting technologies were interest and exposure:

> So, they may or may not be more at that depending on how interested they are in that . . . I do find that the more exposed you are to the younger generation, the more likely you are to have and use these things.

Technology companies promote themselves on social media because peer influences are powerful. Ellen suggested that authorities, such as schools and employers, should encourage the use of technologies. Once introduced to technology, seniors may attend computer training to achieve proficiency.

Computer Training

Both Flora and Beth thought seniors could learn to use modern technologies. While they could learn under favorable conditions, just giving a device to Grandma would not work. Beth stated, "You can show grandma how to use it but you can't just hand it to her and say, 'Grandma I bought you this nice cellphone so now we can talk together.' Poor grandma's gonna go, you know, scary." Training young people to use

new software and devices is easier than training seniors because the former adjust more quickly and feel fewer restrictions (Luppi, 2009; Mitra & Rana, 2001). Children and grandchildren could teach their seniors, sometimes through gaming; however, age-appropriate training was indispensable for older adults (Wagner et al., 2010).

An instructor should recognize that boomers, who had little prior knowledge of the jargons and concepts, made a conscious decision to pursue these skills. Beth alleged age-appropriate training was the key to success. Carol mentioned some public libraries offered computer courses for seniors. Incidentally, Daisy encountered ineffective computer training because the teacher did not customize the instructional methods to learners. She advocated computer education should be tailored to the learners, using appropriate language.

Furthermore, Grace suggested a supportive and encouraging environment should ease anxiety and foster learning. With practice, seniors would gain confidence and experience less anxiety. Flora recalled her coworkers, who were in their 60s, had a hard time learning computer. At first, they found it challenging just to log in and use e-mail. Two years later, they became familiarized with the skills. "Given the right support, it's not difficult. It's cool." One of them had completed an online learning module without any help, which was a huge step forward.

Unexpected Findings

Three unexpected themes emerged during data analysis.

- Although participants thought seniors were not technology proficient, no participant admitted they were in the old-age bracket.

- Every participant showed high computer confidence although literature showed lower computer self-efficacy in females (He & Freeman, 2010; Middleton et al., 2010; Selwyn, 2007).
- Every participant was a leader in her respective field.

The last finding was significant. Participants' inability to decide to use mobile collaborative learning could impede productivity. In Section 3, I have devised a training course to overcome this problem.

The age perception. Every participant alleged age was a significant negative factor for using the computer, but each participant defined old age at least a decade older than her age. Baby boomers frequently refuse to identify themselves as old because of the negativity affixed to advanced age (Dean, 2015). Ageism has always been a form of discrimination with a tremendous impact because someday, young people will grow old (Jonson, 2013). Nevertheless, younger people regard seniors as *the others* and think they will be different when they come to old age (Jonson, 2013). Although the other generations commonly regard the retiring baby boomers as seniors, boomers do not concur (Dean, 2015). Canadians describe people reaching the age of 65 as seniors, although the definition is debatable (Turcotte & Schellenberg, 2007). This age discord was evident in the participants of the current research.

Because the boomer generation spans almost 20 years, I expected different perspectives and experiences among participants of various ages; however, this was not the case. Judging age of the participant by the responses was impossible.

High computer confidence among participants. Contrary to the conclusion from the literature search that older females exhibit lower computer self-efficacy and more computer anxiety (Broady et al., 2010; He & Freeman, 2010; Middleton et al., 2010; Selwyn, 2007; Wagner et al., 2010), every participant showed high computer confidence. On a range of 1 to 10, the participants evaluated themselves between 7.0 and 8.5. The mean score was 7.63. Assessing participants' computer skills was not an objective of the current research; however, because every participant studied or worked at a Canadian university, everyone possessed a certain degree of computer competency. The self-assessment was, in fact, a gauge of self-efficacy. The results indicated participants thought they had high computer competency.

On the other hand, a Dunning-Kruger effect might have occurred (Kruger & Dunning, 1999). Kruger and Dunning observed that unskilled individuals over-estimated their abilities because of metacognitive preconception and that augmenting knowledge on the subject matter could reduce the overestimation. Although each participant in the current research used the computer in her daily life, some participants did not demonstrate high degrees of understanding in certain areas, such as privacy settings in social media. Some participants admitted they could not execute some common functions with their devices. Others did not know how to get help because a manual was unavailable and some lacked troubleshooting skills with their devices or apps. They often confused the terms web, app, and program.

Although older adults may have problems recalling terminology (Craik & Bialystok, 2006), my observations suggested a suboptimal understanding of some

fundamental aspects of the online computing environment. Nevertheless, participants who had the most experiences with the computer and Internet did not give themselves the highest scores because they recognized their inadequacies. This observation also agreed with the Dunning-Kruger effect.

Leadership and decision-making about technologies. All participants were in a senior position in their respective institutions. Even full-time students were leaders in other endeavors, which was unexpected. High education attainment, which was positively related to income or position, could explain this finding (Statistics Canada, 2015). Most participants pursued education for career enrichment.

Due to the senior positions, participants' decisions could have had a significant impact on their organizations. Still, there was no evidence they had taken a lead in promoting mobile collaborative learning. Participants' inability to make decisions about technologies could hinder productivity and competitiveness.

Discussion

At first glance, the findings did not support the assumption that female baby boomer students underuse mobile collaborative learning because every participant indicated they had experience with the Internet and online collaborative learning. However, most participants were skeptical about cloud computing. Although others wanted to learn certain functions on their mobile devices, they did not know how to obtain instructions. These observations demonstrated inadequate basic knowledge of mobile technologies.

By and large, e-mail and Facebook, the universal social platform, remained the primary means of collaboration. Some participants refrained from posting on social media because they were not familiar with privacy settings. Participants who were current students used Google Docs for mobile collaborative learning. Google Docs was not school-endorsed but was popular among students. I observed that most participants did not initiate a mobile collaboration.

All participants thought seniors were less computer proficient than younger users; however, there was no consensus if women were less computer savvy than men. Some participants experienced stereotyping that belittled older women while others did not feel disrespect.

Most participants suggested age-appropriate computer training was vital for the adoption of technologies. Furthermore, instructions should be delivered using the language tailored to learners. A supportive and inclusive environment fostered learning. Finally, collaborative learning would provide a sense of community, which would improve the learning experience.

Overall, I conclude participants in this study underused technology. Although in a senior role at work, the participants were followers with mobile collaborative learning. The underlying reason was inadequate knowledge, which in turn led to limited ability to make decisions about the use of technology. Even if their peers suggested employing new mobile technologies, I suspect the participants may not have adequate knowledge to make informed decisions about use of those technologies.

Due to the lack of understanding, participants could barely cope with the pace of changing technologies. For instance, Grace mentioned she and her friends felt apprehensive when apps were updated because they needed to adjust in response. While participants struggled with Web 2.0, Web 3.0 and Web 4.0 are becoming more frequent and more important on the Internet (Aghaei, Nematbakhsh, & Farsani, 2012). Female boomers may not be ready.

To summarize the results, an overview of needs for improvement included privacy and security knowledge on mobile platforms, troubleshooting and problem-solving skills, and some basic understanding of terminologies and concepts such as the cloud. Also, participants should learn some productivity tools such as password or e-mail management apps. They should also familiarize themselves with sharing files and using social media for collaborative learning.

Evaluation of Qualitative Research

Qualitative research should be credible, dependable, and transferable (Lodico et al., 2010). When these criteria are met, readers will be convinced that the research is an accurate representation of the participants' experiences (Lodico et al., 2010). Following are the methods I used to warrant adoption of such attributes in the current study.

Credibility

A phenomenological study is credible when readers and participants are assured that the results present participants' perceptions accurately (Lodico et al., 2010; Merriam, 2009). The prerequisites for a credible study are evidence of adequate immersion, that the researcher has adequate experience in the field of study, has established a rapport

with the participants, and has the same vocabulary as the participants (Lodico et al., 2010). The researcher should collect and analyze data concurrently until saturation is attained; saturation is characterized by the cessation of obtaining new information (Merriam, 2009; Moustakas, 1994). Reflexivity is required--the researcher must identify and address possible biases (Merriam, 2009). Other strategies used to ensure credibility include triangulation, member checks, attention to voice, and negative case analysis (Lodico et al., 2010). I did not use a peer debriefer or external audit (Lodico et al., 2010) because these methods required extra personnel and resources.

Triangulation. Triangulation is achieved by converging multiple methods, data sources, investigators, and theories (Merriam, 2009). In the current study, each participant supplied three sets of data. First, the participant submitted an image in whatever way she chose. The method of her choice reflected whether digital communication methods were natural choices for a participant.

Only one of the eight participants submitted an image with her cellphone. While all the others used e-mail, Beth also supplied a printed image. She explained that she planned to send a photo but could not locate it. When she came across another image after submitting the first, Beth decided to print it. Therefore, a total of nine images were submitted -- two pictures of animals, a cartoon, three scenery photos, and three pictures of persons.

During the interview, the participant and the interviewer discussed the respective images. The content of the discussion agreed with the rest of the interview. Therefore, the images served as triangulating information. Amy submitted a picture of herself in a

glass-blowing class. When she tried to show me the end product, she pressed her phone so quickly that it froze. I noted Amy's behavior, which was consistent with her responses in the interview--she valued efficiency and occasionally became impatient.

Beth showed me a cartoon of a woman pole-dancing. It was also consistent with Beth's bold and confident personality. Daisy submitted an image of Madam Curie sitting among female scientists, while Ellen e-mailed a picture of George Takei. Both images contradicted the stereotypes. While Madam Curie was a pioneer of radiation science in the male-dominant discipline, George Takei was a champion of social media, even though he was 77 years old. Grace supplied an image that depicted harmony, which she valued during collaboration.

The second set of data came from the interviews. The above Results subsection provided a detailed account of the analyses.

Lastly, participants answered a follow-up questionnaire (Appendix F) after the interview. The questionnaire was a valuable piece of information because the responses were the product of interaction (the interview) and reflection. Again, the method of submission (paper or online) was an assessment of the participant's comfort using the Internet. Furthermore, the three collections yielded information from different timeframes (Lodico et al., 2010; Merriam, 2009) -- before, during, and after the interview.

Every participant responded online except one faxed her response. All participants responded positively to mobile collaborative learning. They were interested

in learning more about the technologies. Most participants preferred collaborating over learning alone. Table 2 summarizes responses to the first five Likert Scale questions.

Table 2

Responses to the Likert Scale questions

Question	Strongly Agree	Agree	Disagree	N/A	Mean Score (SD)
1. Mobile collaborative learning is a useful strategy for me.	4	4	0	0	3.50 (0.53)
2. I prefer learning with peers than studying alone.	1	4	2	1	2.50 (1.20)
3. I am interested in collaborative learning through online social networking.	4	4	0	0	3.50 (0.53)
4. I have experience in mobile collaborative learning.	3	4	0	1	3.00 (1.31)
5. I would like to learn more about mobile collaborative learning.	3	5	0	0	3.38 (0.51)

Note: Because there was no response to the option Strongly Disagree, the column is omitted. Scores were recorded as follows: strongly agree = 4, agree = 3, disagree = 2, strongly disagree = 1, and N/A = 0. SD = standard deviation.

Question 6: After the interview, are there any changes of your perception about mobile collaborative learning? If yes, how? If no, why? Of the eight participants, three indicated they gained new insights about mobile collaborative learning. They thought

technologies could enhance learning. Two participants did not specify yes or no but they both expressed their support for mobile collaborative learning. One participant indicated her support for mobile collaborative learning remained unchanged. The remaining two participants did not change their perceptions because they did not find any new information during the interview.

The last question was Question 7: Do you have anything else you would like to share? Although three participants did not give additional comments, three other participants indicated they enjoyed the interview. I have incorporated comments from the remaining two participants into the Results.

Member checks. To ensure precision and avoid bias, qualitative researchers often send their interpretations or interview transcripts to participants for verification (Lodico et al., 2010; Merriam, 2009). In the current study, I sent textural-structural descriptions to each participant for member checks as suggested by Moustakas (1994).

Every participant agreed with the interpretations with very few changes. I sent an e-mail invitation to each participant and provided instructions for the member check. I stated that the attachment sent for review was an analysis rather than a transcript (Carlson, 2010). The original verbatim transcript was not provided in order to avoid embarrassment that might be caused by grammatical errors and to avoid extended editing that might jeopardize the integrity of the interview (Carlson, 2010). Also, I obtained approval for using direct quotes in the manuscript, preventing inadvertent inclusion of content not intended for publication.

Dependability

Audit trail, triangulation, peer examination, and researcher reflexivity are the strategies used to convince readers that a study is dependable and consistent (Merriam, 2009; Thomas & Magilvy, 2011). Merriam stated the evaluation for a qualitative research is "whether the results are consistent with the data collected" (p. 221). Contrary to quantitative research, a qualitative study cannot and should not be repeatable, nor should it be evaluated by statistical methods (Lodico et al., 2010; Merriam, 2009; Thomas & Magilvy, 2011). Thus, the investigator is the instrument, and the research questions are highly contextual in qualitative research (Merriam, 2009; Thomas & Magilvy, 2011). Therefore, readers should not expect the same results when qualitative research is conducted by different researchers or in different settings (Merriam, 2009).

In the methodology section, I provided detailed accounts of how and why the research was designed and executed. Readers should be able to appraise the dependability or reliability by following this trail. According to Thomas and Magilvy (2011), the researcher should explain every step in detail, including the research question, sample size and method, data collection, and analysis method. Therefore, an audit trail is a means of convincing readers that the current study is empirical research that is a meaningful representation of the participants' experiences.

Transferability

Rich, thick descriptions facilitate transferability of a qualitative study (Lodico et al., 2010; Merriam, 2009; Tracy, 2010). The researcher does not aim for generalizability of qualitative research because qualitative methods do not involve randomization and

statistics (Lodico et al., 2010; Merriam, 2009; Tracy, 2010). Yet, readers can still apply what they learn from the qualitative studies to other scenarios (Lodico et al., 2010; Merriam, 2009; Tracy, 2010). Merriam explained, "every study, every case, every situation is theoretically an example of something else" (2009, p. 225). For these transfers to happen, the readers must be able to resonate with the research, finding contextual similarities before they apply the results to another scenario (Tracy, 2010). Although readers make the judgment, the researcher is responsible for supplying adequately detailed accounts of the context, participants, method, and results for the readers to make such decisions (Lodico et al., 2010; Merriam, 2009; Tracy, 2010).

Dealing with Discrepant Cases

Miles and Huberman (1994) classified discrepant situations into five categories: Outliers, extreme cases, surprises, negative evidence, and rival explanations. While they all contradict the main findings, these categories represent different levels of disagreement. The researcher should search for nonconforming cases preemptively (Barbour, 2001; Lodico et al., 2010; Merriam, 2009; Miles & Huberman, 1994). Occasionally, informants may give responses that the researcher does not expect. These surprises may result in useful interpretations (Miles & Huberman, 1994). As part of triangulation, discrepant case analysis is used "as a procedure to refine, broaden, or elaborate a construct in which discrepant cases are found" (Borman, LeCompte, & Goetz, 1986, p. 3). Barbour (2001) further argued that qualitative researchers should actively seek out outliers, as opposed to quantitative researchers who use various methods to exclude them.

Investigating discrepant cases may yield new insights. In some cases, these participants may supply information that confirms the hypothesis (Miles & Huberman, 1994). Morrow (2005) suggested comparing discrepant cases with conforming cases to illustrate complex relationships in the phenomenon. For instance, a female boomer in the computer industry may have disregarded the stereotype and engaged in mobile collaborative learning. This case does not confirm the phenomenon but supports the hypothesis.

Frequently, a discrepancy may indicate an alternative hypothesis or the initial analysis was biased (Miles & Huberman, 1994). Borman, LeCompte, and Goetz (1986) alleged a negative case prompted reconsideration of the original theory and construction of an alternate hypothesis. Onwuegbuzie and Leech stated negative case analysis "is the process of expanding and revising one's interpretation until all outliers have been explained" (2007, p. 13). Miles and Huberman suggested the researcher should develop a few alternative explanations and examine them during data analysis because the very end of the research may be too late to recruit additional participants for confirming a rival hypothesis. According to Miles and Huberman, these individuals can be difficult to identify or approach. Creswell (2008) suggested that snowballing was a sound strategy.

In the current research, most participants were computer savvy and that necessitated a revision of the hypothesis. The high computer skills were an unexpected finding; however, with careful considerations pinpointing mobile collaborative learning, it was evident that the participants were not knowledgeable enough to become a leader in the use of mobile collaborative learning.

Conclusion

The purpose of this study was to explore the underuse of mobile collaborative learning in female boomer students at a university. Phenomenological research resulted in the construction of an essence of the participants' experience. The research was designed to follow the Modified Stevick-Colaizzi-Keen method and ensured credibility, dependability, and transferability.

The results answered the research questions. Although participants were computer proficient, they showed suboptimal understanding of mobile technologies.

RQ1: How did female boomer students describe experiences with mobile collaborative learning? Most participants had some experience with mobile collaborative learning; however, they needed a better understanding of the cloud, troubleshooting and problem-solving skills, cybersecurity, and privacy.

RQ2: What was their attitude towards learning with an SD? All participants felt positive towards mobile collaborative learning, and some were familiar with this technology. Still, they did not demonstrate leadership regarding the use of mobile technologies for collaboration.

RQ3: What were the barriers that prevented them from using technology? The major obstacle that prevented the participants from adopting technologies was embracing the change process and learning new knowledge. Other deterrents included security, privacy, and technical difficulties. Participants also agreed that older people struggled with technologies but did not concur that females were technologically incompetent.

Female boomers need to improve on cloud computing and related subjects. Tailored computer training would equip the learners with the required knowledge to make informed decisions about the adoption of mobile technologies, which aligns with becoming a leader in the use of mobile collaborative learning. In the next section, I will describe a learning experience for mature students. The aim is to educate them about mobile collaborative learning and prepare them for the fast-changing online environment.

Section 3: The Project

I determined from my results that female boomer students underused mobile collaborative learning due to inadequate knowledge; still, the ability to collaborate using technologies has become a requirement. Female boomer students will soon fall behind if they do not reinforce their knowledge to keep up with technological advances. The current project is a training course that addresses this impediment.

A literature search revealed that *blended learning* is the method of choice. I have included individual and group projects in a scaffolding manner for students to learn both mobile technologies and collaborative skills. Students have the autonomy to discover and learn relevant topics using crowdsourcing and peer tutoring because covering every technological aspect is impossible. Students use personally owned devices in the classes, simulating real life scenarios. Reflection is the primary means of learning and assessment. I described the project in detail in Appendix A.

Description and Goals

I designed this project to address the lack of comprehension of mobile technologies by updating older learners' understanding in the areas of security, privacy, troubleshooting and problem-solving skills, and cloud computing. The training also reinforces their knowledge to prepare for new technologies.

The first goal of the project is to promote mobile collaborative learning through training, which in turn will improve the learning experience in the students' endeavors. The second goal is to prepare the students to adopt future technologies that emerge at a rapid rate. In other words, students will learn how to learn. The third, most important

goal is to educate students, so they will become informed users. They will be able to make intelligent decisions about the technologies that align with their roles as leaders in their respective professions.

Rationale

I designed a computer training course for female boomer students. The purposes of this course are to address deficits I identified in Section 2 and to prepare the learner to face new technologies that are quickly emerging. Many MOOCs (edX Inc, 2016) respond to the learning demand since cloud computing is a new technological genre, but these courses are usually self-paced and lack learner interaction. The current project not only helps teach cloud computing but also emphasizes collaborative skills and the use of mobile devices to solve real life problems.

Instructional design for older learners to learn technology involves explicit, step-by-step training, and ample support (Barnard, Bradley, Hodgson, & Lloyd, 2013; Sweller, 2016; Wolfson, Cavanagh, & Kraiger, 2014). A supportive environment in which learners can practice new skills fosters learning (Barnard et al., 2013; Sweller, 2016). The learning experience should be highly structured where instructors should provide prompt feedback (Wolfson et al., 2014). A *blended class* best suits the need for delivering core knowledge and practice online functionalities (Wolfson et al., 2014).

Ample time will be allowed for practice. Because the goal is understanding, the course will entail researching and writing about various topics, such as how to troubleshoot computer problems. On completion, students will be fully familiar with the mobile collaborative learning environment. They will comprehend the structures and

languages of cloud computing. They will know how to protect their privacy and their data from computer hacks. Most importantly, they will be well-versed about the mobile environment and will be able to make informed decisions about technologies both at school and at work.

An all-female environment may be more favorable for learning computer skills (Cooper, 2006); however, some research participants did not agree that a gender divide existed. A recent report also suggested an equal use of SDs in both sexes in Canada ("Canada digital future in focus," 2015). With little evidence supporting a single-gender function, I will not specify the gender as a prerequisite for the course. Nonetheless, I will specify that the pace and format will be appropriate for mature learners.

Review of the Literature

I started the literature search and acquired a sense of the research findings with Google Scholar. Then, I searched multiple databases such as ERIC, EBSCO, ProQuest, and ScienceDirect. First, I searched the literature for instructional strategies and methods for designing computer courses. Initially, the keywords used were *computer education*, *computer training*, and *computer skills*, and all were limited to older adult learners. Again, the literature search for older learners mainly yielded seniors aged 60 or older. Young baby boomers were largely out of the picture, indicating a knowledge gap. This gap, however, was bridged by the current research.

Search terms consisting of *collaborative learning* that I restricted to learning and teaching yielded useful current articles. A book by Barkley, Cross, and Major (2014) provided tools and a roadmap for the project design. A blended class is a logical choice

for the current project. A literature search using the keywords *blended learning* and *blended class*, limited to higher education, yielded insights for project planning. I also incorporated *BYOD* and *class-sourcing* into the current project.

Mobile Collaborative Learning in Female Boomer Learners

In Section 1, I presented the concept and advantages of mobile collaborative learning and its relevance to female boomer learners. I found that female boomer students underused mobile collaborative learning. The underlying reason was a lack of understanding.

Older computer users struggle to adopt and conform to contemporary technologies, which change at an unprecedented rate. While young people learn emerging technologies effortlessly, older people find them more difficult to learn. Older people require context from their experience to comprehend new information (Craik & Bialystok, 2006). Older learners need to recognize the necessity to adopt technologies (Wu, Damnee, Kerherve, Ware, & Rigaud, 2015). Wu et al. (2015) stated a supportive and safe environment was useful to foster learning and peer tutoring.

Instructional Methods to Foster Mobile Collaborative Learning

According to the results of the current research, most learners have experienced some form of collaborative learning. In contrast to school-aged students, who use the computer to collaborate by default, mobile collaborative learning is an acquired skill for baby boomers. Instructors must design means to ensure meaningful and effective learning.

Collaborative learning is considered to derive from social constructivism (Bonk & Cunningham, 1998; Kim, 2001). Bonk and Cunningham (1998) described some social constructivist teaching principles that I have adapted to the current project. For instance, I designed activities to solve real life problems. Students will be free to form teams based on mutual interest. The teams will decide which topics to tackle and activities will be result-oriented. Both team and individual reflections will be used to construct and share learning experiences. Formative assessment will be used to assess individual and group learning.

I developed the project with three features of collaborative learning (Barkley, Cross, and Major, 2014, p. 4):

- The course should be designed to incorporate intentional structure. Instead of letting learners collaborate freely, teachers should employ various activities to achieve different learning goals.
- The course should be designed to ensure team members contribute equally. In the current study, research participants also highlighted this point as a major factor for collaboration.
- Also, the course should be designed to assure that meaningful learning takes place. In the proposed course, learners will collaborate using mobile devices.

In collaborative learning, team members find a sense of belonging in a learning community. There must be group norms, shared values, and rules; all are important in a multicultural team for smooth collaboration (Barkley et al., 2014; Nicolson & Uematsu, 2013). The first agenda in the initial meeting will be the establishment of ground rules.

The course will include face-to-face sessions where the students attend lectures, discussions, and presentations. Students will decide the project topics collectively. First, each student will research individually. Then, students who use the same platform (for instance, iOS or Android) will group together. Finally, students using different platforms will work together for final projects.

Clear explanation of objectives, procedures, and rules is indispensable to encourage collaboration. Teachers should observe the collaboration but not be obstructive. According to Barkley et al. (2014), many problems may arise during collaboration, such as unequal participation, resistance to group work, group discord, competition for leadership, students performing at different levels, learning at different rates, attendance issues, and cheating. In the current project, care is taken to prevent such predicaments.

Learning Objectives

A revised Bloom's Taxonomy (see Figure 5) outlines the learning objectives at six levels: knowledge, comprehension, application, analysis, evaluation, and creation (Nkhoma, Lam, Richardson, Kam, & Lau, 2016; Sosniak, 1994). The project is planned to achieve these objectives, using different activities such as lectures, group projects, essays, presentations, and reflections.

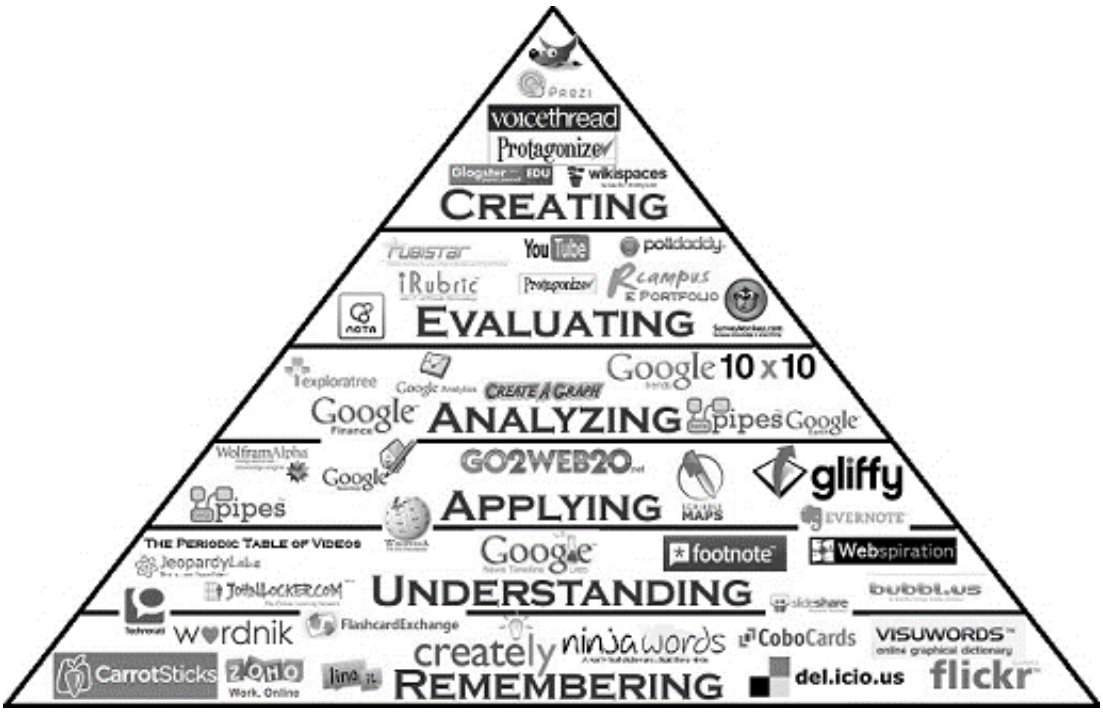


Figure 5. Revised Bloom's Taxonomy by Samantha Penney. Reprinted with permission under Creative Commons licensing system. Originally, this diagram is an interactive pyramid that links apps to the corresponding learning objectives.

Blended Learning

Osguthorpe and Graham (2003) stated that "blended learning combines face-to-face with distance delivery systems" (p. 227) and that the method used the strength of both systems for specific learning goals. Because the current project is mobile collaborative learning, it is logical to employ the online learning environment. Still, face-to-face classes serve the functions of lectures on core knowledge, the practice of computer skills, acquaintance with fellow students, and team building.

Collaborative learning is a complement to other instructional methods like lectures (Barkley et al., 2014). Instructors could distribute online lectures before or after face-to-face classes for preparation or class extension (Montrieux, Vangestel, Raes,

Matthys, & Schellens, 2015), though the choice would depend on the goal of the course. In the current project, most lectures will be delivered face-to-face, allowing ample time for question and answer sessions. As the course progresses, students will research their material using online resources.

Bring Your Own Device

Bring your own device (BYOD) is a new trend at work and at school (Afreen, 2014). BYOD means learners bring and use their personally owned mobile devices for educational activities (Afreen, 2014; Kong & Song, 2015). Kong and Song (2015) considered BYOD a "personalized learning hub" that is especially pertinent to higher education.

In this course, students will use their SDs. Learning activities using mobile technologies can improve student engagement, especially when students feel comfortable using their personal devices (Afreen, 2014; West, 2013). In a pilot study conducted in a problem-based learning (PBL) tutorial, students overwhelmingly (89%) recommended BYOD. They thought BYOD improved PBL and accuracy while it did not interfere with group dynamics (Falconer, Gray, & Gaul, 2014). Common concerns about BYOD were distraction, cheating, incompatibility, cyberbullying, intellectual property issues, accessing inappropriate content, sexting, deteriorating writing skills, and security and privacy concerns (Lai, Khaddage, & Knezek, 2013; Marcoux, 2014; O'Bannon & Thomas, 2014; Thomas, O'Bannon, & Bolton, 2013). Affordability and adequacy of infrastructure (Afreen, 2014; Lai et al., 2013) are not a concern in this project.

In the current project, BYOD is possible because 76% of Canadians own smartphones ("Smartphone behaviour in Canada," 2016). Thus, most students already own an SD. The most popular mobile operating systems (OS), Android and iOS, constituted 89% of the Canadian market ("Canada digital future in focus," 2015). In the current project, students first become acquainted with their OS. In the following tasks, they will group with students with different OSs to simulate real life situations.

Problem-based learning

Initially, tutors in medical schools used PBL to challenge medical students with different scenarios. Each student studied the problem and discussed it within their small groups (Wood, 2003). PBL somewhat resembles collaborative learning because students define and solve real-life problems. They pool information and resources to devise a solution, creating and distributing knowledge during the process.

The PBL model is consistent with constructivism (Hung, Jonassen, & Liu, 2008). Although PBL was criticized as time-consuming, ineffective, and over-simplified (Kilroy, 2004), the model has been widely adopted by higher education and K-12 schools (Hung et al., 2008). Hung et al. (2008) stated PBL was student-centered, which promoted self-directed learning and reflection; however, basic knowledge could be sacrificed for higher-order thinking and problem-solving. Comprehension and problem solving are goals of the current project, which means PBL is a good strategy.

Crowdsourcing and Class-Sourcing

Students in the current project will decide their topics, and the deliverables will be digital artifacts. The tactic is called crowdsourcing or class-sourcing. There is no

standard definition for crowdsourcing. The term usually applies to an online environment. In general, crowdsourcing refers to groups who contribute work on a variety of problems (Doan, Ramakrishnan, & Halevy, 2011). The most prominent example of crowdsourcing is Wikipedia (Doan et al., 2011; Kittur, 2010; Tsipursky, 2014). While crowdsourcing refers to groups where people collaborate explicitly, similar activities exist implicitly in a much boarder sense (Doan et al., 2011). Crowdsourcing contributors may be required to work independently or collaboratively (Doan et al., 2011; Kittur, 2010), depending on the projects; however, Kittur (2010) found that collaboration yielded a high-quality outcome when tackling complex and challenging problems. He also mentioned students' collaboration on report writing as an example of crowdsourcing.

Tsipursky (2014) suggested class-sourcing, a term derived from crowdsourcing, to describe a teaching strategy. In class-sourcing, students collaborate to produce digital artifacts such as websites, blogs, presentations, and videos. Tsipursky (2014) reported additional benefits; students developed digital literacy, data management, digital design, digital communication, collaboration, and public presentation skills (p. 5). Many of those skills are also goals of the current project. Therefore, class-sourcing is a good strategy to use in the current project.

Reflection as a Learning Strategy

The concept of reflection has different meanings and functions in various contexts. Different terminologies may have slightly different meanings while some terms are interchangeable (Ryan, 2013). A simple description of reflection is a cognitive process of contemplating an experience which results in an action plan for future

encounters (Rogers, 2001). According to Garrison and Kanuka (2004), writing could foster reflection while asynchronous discussions in a blended class enabled reflection.

Scaffolding the reflective process. Ryan (2013) described in detail four levels of reflection and how teachers could facilitate and evaluate reflection. The levels were arranged in a scaffolding manner, indicating advancement and development of the reflective capabilities.

Level 1: Reporting and responding. At this level, a student should be able to describe the subject being reflected on and provide personal opinions. In the proposed course, problem-based scenarios will provide students a safe environment to ponder the what and why of the issue.

Level 2: Relating. A learner relates the issue to experiences and knowledge and muses on an action plan. The learner also evaluates the resources needed.

Level 3: Reasoning. This stage is more discipline oriented. Students will discuss alternatives and supply evidence from the literature. They may also reflect on ethical considerations.

Level 4: Reconstructing. This stage builds on the previous stages. Ideally, students should be able to experiment with their action plans in a low-risk environment. In the proposed course, students will attempt different functions with their devices.

A person who reflects must take possession of the reflection instead of acting as an onlooker (Ryan, 2013). Reflection has become more common since people frequently opine on social media. Instead of written reflections, students can present their findings in other forms such as videos (Coulson & Harvey, 2013). The reflective practice has

been criticized as time-consuming (Coulson & Harvey, 2013), or even as being a tool of coercion and surveillance (Bulman, Lathlean, & Gobbi, 2014). Yet, most educators embrace reflection for fostering deep learning.

Blogging. Blogging is a form of micro-publication (Williams & Jacobs, 2004). Bloggers typically include opinions, and thus, blogging is a product of reflection (Williams & Jacobs, 2004). In addition, Williams and Jacobs (2004) highlighted the importance of including hyperlinks in blogs, which enabled revisiting related articles on the Internet, and further encouraged reflective thinking. Also, Williams and Jacobs (2004) stated blogging fostered collaboration. Buxton and Ellison (2015) suggested that blogging was a great format for reflective practice while rubrics assessed the learning process.

I incorporated information from the above literature review to devise a strategy for the reflective practices. The resultant project includes two levels of reflection.

Level 1: Group reflection. In mobile learning, social media encourages collective reflection (Fisher & Baird, 2006). Students will post their results on each task to a social media platform that is exclusive to the class. Google+ is the ideal venue (Brigham, 2014). Students in the class will be required to comment or ask a question about the posts. Ground rules will ensure this forum is safe and respectful, while students will be encouraged to support their comments with evidence from the literature. Student responses will be evaluated as a measure of online participation. Simple comments such as yes, no, or good will not qualify. Most students are well-versed with this kind of

communication using social media. While simple to execute, the method does not evaluate or control the quality of reflection.

Level 2: Individual reflection. Individual reflections will be kept private because the contents can be personal (Coulson & Harvey, 2013). Each student will submit reflective essays via Turnitin. A rubric with prompts that facilitate different levels of reflection will guide the grading process. Because it is private, students may discuss in-depth and relate their personal values. This assignment serves as an evaluation of how much an individual student learns, thus, supports deep learning.

Implementation

I will communicate with the partner university and present the detailed description of the course proposal. The course addresses a knowledge gap regarding mature students' learning needs and is directly applicable to the university. The course will have no prerequisite because every student has attained some degree of computer literacy and English language proficiency.

Potential Resources and Existing Supports

The infrastructure at the university makes the project feasible. Students can access the Internet using the university provided Wi-Fi. The university also provides a comprehensive range of technical support to both teachers and students. Because the course will use popular apps, specialty software or extra equipment will not be necessary. Blackboard will remain the teaching management platform. During the practice session, teaching assistants (TAs) will advise on technical issues.

Potential Barriers

Certain aspects of the concepts, planning, and execution of the project are different from a traditional course. I have confirmed that the project fulfills requirements for the fair and appropriate use of technologies. Staff and students will avoid infringing intellectual property rights and privacy policies. Behaviors such as harassment, cyberbullying, and plagiarism will be strictly forbidden.

Teachers may not be knowledgeable about or experienced with teaching blended classes (Güzer & Caner, 2014; Nicolson & Uematsu, 2013; Osguthorpe & Graham, 2003). Furthermore, students do not just automatically collaborate effectively and produce quality results. Teachers should design appropriate activities for every learning experience, including different ways of collaborating (Barkley et al., 2014). It may be a challenge for students to engage in class-sourcing because it is a new concept. Also, students need to learn how to reflect effectively (Coulson & Harvey, 2013; Ryan, 2013). In sum, both teachers and students may not feel comfortable with the new format. Careful planning using clear instructions, guidelines and prompts for assignments, and detailed rubrics will promote favorable teaching and learning experiences.

Each student should bring an SD to the BYOD class. A high percent of Canadian students own mobile devices, although an exact figure is unavailable. A survey at a university in the United States found that 96% of students owned either a smartphone, a tablet, or an e-reader, and the percentage was on the rise (Chen, Seilhamer, Bennett, & Bauer, 2015). Because ownership of an SD is related to income (“Canada digital future

in focus," 2015), many students should have one and those who do not can approach the university for assistance.

Chen et al. (2015) found that despite the high percentage of people who own mobile devices, mobile learning was still in its infancy. TAs will provide technical support to aid teachers and students who have not used the full potential of mobile technology for learning. Because most TAs are young, they must be vigilant to use appropriate vocabulary, the speed of speech, and pace of demonstration to accommodate older learners.

Proposal for Implementation and Timetable

The course on mobile collaborative learning will span a 16-week semester. Students will earn a full semester credit while learning essential skills. The course will transition from classroom lectures to mobile collaborative learning. Planning such a course involves the development of content appropriate for mobile learning, derivation of collaborative tools and activities, production of multimedia material, and dissemination of knowledge (López-Yáñez, Yáñez-Márquez, Camacho-Nieto, Aldape-Pérez, & Argüelles-Cruz, 2015). On the other hand, developing mobile learning software is not the goal of the current project. While some educational technology experts strive to develop computer-assisted learning systems, some authors claimed that certain tools did not achieve their goals because the tools were not consistent with learners' needs (Tang, Winoto, & Leung, 2014). The university employs a platform to track, distribute, and communicate course material and activities; however, exclusively using it for this project forfeits the learning goal, which is to apply the students' computer knowledge in

everyday life. Therefore, I will also take advantage of widely available and inexpensive mobile apps.

I have decided to use a popular platform, Google Apps, for most activities. Google provides a comprehensive solution for many different tasks. Most of the apps and services are free, and users can sign in with a single set of usernames and passwords. Most people have already registered for a Google account, making it easy to adopt. Also, once students become familiarized with Google Apps, they can use their skills for daily applications. Acquiring a firm foundation will enable them to adapt new technologies and apps that emerge even after the course is complete. In fact, students in this course will be encouraged to explore popular apps that are downloadable from the app stores. On the other hand, students will submit their assignments via Turnitin to discourage plagiarism.

Roles and Responsibilities of Students and Others

As stated above, both teachers and students may not be familiar with the blended classroom. Both parties will form a partnership and will learn and develop together.

Roles of the students. Students can be teachers. Kurczek and Johnson (2014) stated students found that sharing, or teaching, their research with fellow students and the teacher was a valuable and useful experience. Class-sourcing (Tsipursky, 2014) will be an important part of the project, where students identify a problem, research, analyze, and present the solutions to the class.

Roles of the teacher. Because knowledge emerges at such a quick pace, the teacher can no longer be a source of information. In a learner-centered environment, the

teacher is a co-learner (Knowles et al., 2005; Kurczek & Johnson, 2014). Also, the teacher is a facilitator who plans and conducts the activities (Akella, 2012). TAs are mentors and resource persons who help students when technical difficulties occur during the practice sessions.

Project Evaluation

There are two levels of assessment for project evaluation. Formative assessments will measure how well the students learn while summative assessments will evaluate the course itself.

The Formative Design

In addition to measuring outcomes, the assessments should also provide feedback to individual students for monitoring progress during the course. Therefore, formative assessment is the logical option. In the online environment, at least two metrics need evaluation: (a) how much each student learns and the amount of contribution, such as frequency and duration of participation, and (b) quality of the contributions. This assessment also includes knowing about the status of the group, or group awareness (Janssen & Bodemer, 2013). Using tests to measure learning outcomes is inappropriate because the curriculum is not predefined and standard answers to problems are not possible. Although various metrics can be measured and recorded using embedded tools and pop-up quizzes (West, 2013), writing assignments will be the primary means of assessment. Prompts or questions will provide detailed guides for essay writing so that all the essential components will be present. Rubrics will provide a standard grading system for the essays.

Timely feedback is paramount for a summative evaluation (Spaulding, 2008). There are ample venues for feedback throughout the course. For instance, teachers may join in the Google+ discussions.

Evaluating individual students in a group environment is challenging. Giving the same grade to every student in a group project is unfair because every person may not contribute equally. Some authors suggested that each student grade and comment on the performance of every group member via anonymous evaluation (Janssen & Bodemer, 2013; Lan, Lin, & Hung, 2012; Tsipursky, 2014). However, the grading may not be objective (Lan, et al., 2012), and different evaluators may not use the same criteria. Therefore, clear guidelines and rubrics are necessary.

Rubrics. Some common rubrics, such as checklist rubrics or rating scale rubrics (Suskie, 2009) are straightforward and efficient. However, the rubrics cannot guarantee objectivity and consistency, especially when used by multiple evaluators. Descriptive rubrics (Suskie, 2009) indicate the degree of achievement to each learning goal.

Reflection as an evaluation tool. Reflection is effective in assessing student learning (Buxton & Ellison, 2015; Lan, et al., 2012; Ryan, 2013; Yorke, 2003). In the proposed course, students will write graded reflection essays to provide evidence of deep learning. Clear and detailed instructions with prompts and rubrics will be provided to guide students.

Occasionally, students will write a *minute paper* (Suskie, 2009), a short essay that takes about one minute to complete. The minute paper is a reflective assignment in

which a student answers one or two questions. Teachers will give individual feedback on all reflective papers and decide if a student needs additional assistance.

Project Evaluation: The Summative Design

The following questions serve to evaluate the current project using various assessment tools (Suskie, 2009, p. 6):

- Have students achieved their learning goals?
- What went well and what did not?
- How can the course be improved?

The summative evaluation should adhere to the university's benchmarks, such as:

- assessment results and grades (Suskie, 2009),
- standard student end-of-semester survey (Spaulding, 2008),
- feedback from faculty (Suskie, 2009), and
- retention and participation rates.

The website's traffic (Samuel, 2014) measures the degree of popularity of digital artifacts posted on the Internet. Although the statistics reflect student achievement, it is not a part of the formal evaluation.

Key Stakeholders

In a learner-centered environment, the primary stakeholders are students. Teachers will also develop throughout the course due to exposure to emerging technologies. The course will be available to students at any stage during their program; students will decide the best time to enroll. Mobile collaborative learning enhances the learning experience for mature students and improves success rates. The course will

likely generate revenue for the course provider, especially if it can develop into an MOOC in the future. Well-equipped and informed mobile users are assets to the university and both students and faculty will benefit from the learning experience. Moreover, product developers can use the results of this project to consider their future directions.

Implications Including Social Change

Local Community

University students use the computer both at school and at work. The course is tailor-made for mature students who need context and adequate time to support their learning. The community will benefit when members bring their knowledge to their respective industries as informed decision makers. Competent technology users and leaders in the aging society will be continuously competitive because they stay productive with up-to-date knowledge.

Far-Reaching

With the consent of each student, the teams will post their projects online, in turn, contribute to the body of knowledge and reach any Internet user regardless of geographic location. The course, if developed into a MOOC, can reach a large audience. MOOCs are free and accessible for learners across the globe (Brahimi & Sarirete, 2015; Cooper & Sahami, 2013). I designed the current project with developing into a MOOC in mind. It can materialize when MOOCs have become commonplace.

The course is sustainable because the target population starts with baby boomers but does not end there, due to the ever-accelerating rate that technologies evolve. When

younger users grow older, they will face the same barriers, such as diminishing working memory. New challenges will also surface as technology advances. Although the focus of this course may change as technologies advance, the idea and aim remain. By promoting awareness and tailoring to their needs, silver surfers will use the technologies and will be able to stay updated. Employers and society value these skills, which safeguard competitiveness. In a board sense, the project will effect positive social change.

Conclusion

The discussion in Section 1 described why and how mobile collaborative learning improved the learning experience. Section 2 was a detailed account of the research. Results of a phenomenological research study indicated female boomer students underused the technology. The current section described a computer course I designed based on the results of the study.

The aim of the project is to teach mature students to comprehend, use, and make decisions about mobile technologies. Strategies such as blended learning, BYOD, crowdsourcing, and reflection provide a framework for the teaching plan. Teamwork, a sense of community, peer tutoring, and social media create a supportive learning environment, while ample practice time and instructions using the learners' vocabulary are two unique features.

The course is sustainable because normal aging is the main consideration that will eventually become relevant to all learners. Older people have difficulty learning new technologies and the objective of the course is to overcome this obstacle. In the future,

the course may develop into an MOOC when the online format has become mundane. Trained learners will master mobile collaborative learning. More importantly, they will know how to keep current and make informed decisions about technologies. Because many mature students are leaders in diverse fields, their knowledge can make a huge impact. The project will be beneficial to learners, teachers, the university, the community, and society. In Section 4, I will reflect on the project and my personal development during the process.

Section 4: Reflections and Conclusions

In this section, I will present my reflections on the strengths and pitfalls of the project and suggest some remediation for the limitations. I will present my reflections on my roles as a scholar, a practitioner, and a project developer. The proposed course has a potential to provide sustainable, adaptable computer training that teaches adult learners. Learners with a solid foundation can make informed decisions, which will benefit their institutions and society.

Project Strengths

I identified the problem as underuse of mobile collaborative learning by female boomer students. Because solutions would become outdated due to rapid technological development, the approach of the current project can ensure currency and sustainability due to a flexible curriculum.

Students in the proposed course will build teams that explore current technical problems. During the process, students and teachers will learn about both technologies and collaboration with a clear end-point: The team will share a digital artifact, which will add to the knowledge pool.

Recommendations for Remediation of Limitations

I discovered limitations during the research process despite careful planning. There was a discrepancy in age definition, so the project targeted mature students rather than female boomer students. The lack of formal assessment posed a challenge to evaluating use of mobile technology and the prevalence of a gender digital divide was

also inconclusive. The intended audience may not be enthusiastic about the proposed course.

Nonconformity with the Actual Population

During the interviews, I discovered that every participant was a leader in her respective field. The cohort consisted of a politician, a nurse educator, professionals, and employees who held important positions in public sectors. It may not be conclusive due to the small sample, but boomer women studied at the university for career enhancement in senior positions; however, I did not ask questions about leadership and decision-making.

Recruitment Issues

I experienced some problems recruiting the target population. I identified a knowledge gap about female boomers who were also students in Canadian higher education; however, the research was not meant to be exclusive. If the population had been people experiencing the double digital divide, female and older adults underusing the computer, it would have been impossible to conduct research on either females or seniors due to the vast population. Female baby boomers are a distinct group at the intersection, making them ideal for research, but this narrowed the selection of participants and made recruitment difficult. Due to policy constraints, I posted an advertisement on the university's student website. Several people who responded were too young to participate. Because older students did not fully use the Internet, the recruitment message did not reach most of the intended audience.

Confusing Labelling of Old and Middle Age

Every participant agreed that older people struggled with technology, but there was no clear definition of "old." In Canada, the retirement age is 65, but many baby boomers do not feel they are in an old-age category. Therefore, I have used the term middle age instead of old in the project. Brummel-Smith (2013) defined middle as those aged between 40 and 65 years old, with a transition time of 4 to 5 years at either end. Due to widespread age discrimination, some people prefer subjective over chronological age to classify themselves (Stephan, Sutin, & Terracciano, 2015). For instance, they may judge their age by some physical attributes such as respiratory functions, grip strength, and waist circumference (Stephan et al., 2015).

Lack of Objective Assessment for Computer Knowledge and Use

Objective and maintainable methods to assess computer competency and computer use are not available because technologies change rapidly. Researchers used different assessments ("2010 Canada digital year in review," 2011; "Canada digital future in focus," 2015; Middleton et al., 2010) and achieved different results at different times. In the current research, a few participants mentioned several apps while others did not. Yet, those who demonstrated more computer knowledge did not rate themselves highest, possibly due to the Dunning-Kruger effect (Kruger & Dunning, 1999). Because the research explored underuse, I sought to identify missing knowledge and lack of use of common devices and common software. I found that most participants lack understanding in some basic knowledge.

Inconclusiveness of the Gender Stereotype

Despite evidence from the literature that females did not use the computer as much as males, the participants did not agree with the statement. I have noticed statements in the literature that there was no gender difference in baby boomers, though these statements were not supported ("2010 Canada digital year in review," 2011; Rogers, 2009). My research could have supported this assertion with different procedures. I inquired about both age and gender in the third question in the interview, but the questions were not sequential, which could have affected the way participants responded.

Participants disagreed on whether older females were incompetent computer users; however, it was unclear if they disagreed there was a stereotype. Some participants did not understand the term stereotype and did not respond consistently. Some participants who stated females are as competent as males later described how they felt proud when they demonstrated their computer fluencies. This reflects a struggle with overcoming stereotypes that the participants did not acknowledge. Due to the inconclusiveness about gender stereotypes, I decided to exclude the gender factor in the proposed project. Degenderizing the project is also more inclusive.

Learners' Perceptions of the Project

Because the proposed course will use a new format, targeted learners may not accept it readily. The pragmatic middle-aged learners may not perceive the advantages or the need to participate, however, there is no shortcut that will reduce the complexity of

the current course without sacrificing results. At present, I will use a clear and detailed description of the course to enroll the appropriate audience.

Scholarship

Scholarship encompasses four components: discovery, integration, application, and teaching (Boyer, 1990). Scholarship of discovery refers to quality research in different disciplines that contributes to the knowledge base (Boyer, 1990). The scholarship of integration demands an understanding of patterns and relationships from a holistic perspective (Boyer, 1990). Because knowledge is ineffectual if it cannot be applied, the scholarship of application also implies positive change (Boyer, 1990). Finally, the scholarship of teaching requires dissemination to ensure a continuation of the quest for knowledge, making scholarship sustainable (Boyer, 1990).

Glassick (2000) stated six standards to assess whether scholarship meets the standards for all four components:

- Clear goals: Three goals emerged from the research results. The goals are to provide adults with current mobile technologies, prepare adults for future learning, and empower intelligent decision-making about the use of technologies.
- Adequate preparations: Each element of the project is grounded in educational theories and current and relevant scholarly articles. I have engaged in different activities to gain more understanding. For instance, I experimented with apps I thought might be relevant and studied at a MOOC to learn more about the methods.

- Appropriate methods: A detailed account of both the research and the project facilitates the readers' appreciation of the rationale and approaches. Please refer to Sections 2 and 3.
- Significant results: Some unexpected results emerged which could remain undetected if I had conducted a quantitative research based on facts in the literature. For instance, it was not apparent that female boomer students held senior positions. This finding steered the direction of the project.
- Effective presentation: Throughout the course of the project, I have communicated with my chair and other fellow students through discussions. Also, I have posted articles on a blog that was viewed more than 30,000 times and attracted about 200 followers. The discussions among bloggers are an example of online collaboration.
- Reflective critique: I reflected on the project, leading to shortcomings that I reported above.

Project Development and Evaluation

Instead of a computer training course, which emphasizes practical skills, I developed a course that teaches students how to learn. There are two reasons for this decision. Because technologies change rapidly, the curriculum will become outdated before it can be approved and delivered. Students can also learn from other venues such as an iPhone user taking a tutorial at the Apple store. A student who is equipped with a solid foundation and who knows how to acquire knowledge can explore any function when required.

The course demands a commitment to learning. Using rubrics ensures an equal and accountable contribution from each student. The end products, digital artifacts, will be published online and will be appraised by the public. I avoided using complicated software and systems whenever possible, and employed apps downloadable for free. This strategy enhances skill transference to daily life.

Leadership and Change

Former U.S. Secretary of Defense Donald Rumsfeld (2011) stated that there are "known knowns, known unknowns, and unknown unknowns" (p. i). Leaders explore the unknowns and make them known. Leaders are proactive and reactive and initiate big or small changes. Leaders explore problems and suggest solutions, not just to eradicate the present problems but to anticipate future ones. Many participants mentioned that adopting technologies was managing changes and people needed to "step out of their comfort zone" to learn new knowledge. These interviews revealed how people were afraid of changes, leading me to make the fear of change the basis for the course.

Analysis of Self as Scholar

Conducting this research has changed my perspective of the world. I started a blog to invite discussion, which led me to discover the power of social media -- an experience I incorporated into my project. Reflective notes are imperative; I audio-recorded my thoughts as they emerged. I tried different educational, productive, and collaborative apps such as Nearpod, Notability, Evernote, Trello, and Slack. The experience was invaluable for the comprehension of current technologies.

Analysis of Self as Practitioner

Recently, I joined a discussion among young students who used Google Doc to assemble their final project. Also, I made presentations with a new app, Sway, instead of PowerPoint. I found that new apps are harder to use because they are more complicated with more functions, suggesting prior experience may not be adequate for new technologies. For instance, Beth complained that manuals no longer accompanied mobile devices, leaving new features inaccessible to her. If Beth, an established user, found it difficult; it would be challenging for most users who were less knowledgeable. Furthermore, the interfaces change so rapidly that they will appear foreign to some users. Learners who cannot keep updated will lag behind quickly. Therefore, I found that learning "how to learn" was crucial. To learn more about MOOCs, I enrolled in a course. During the study, I did not only learn the subject, but I also noted the delivery methods and classroom dynamics. I incorporated some of the ideas into the current project, and I hope to develop the proposed course into a MOOC soon.

Analysis of Self as Project Developer

Throughout each step of the project, I have been watching for relevant information. I attended a MOOC, which was different from the courses at Walden University in many ways. Although the course was delivered using a specialty platform, some interactions involved using popular apps such as Google Hangout and YouTube. Also, I followed the teachers' communities regarding instructional methods and technologies and appreciated how rapidly technologies change. I incorporated these experiences into the project.

The use of technologies is a tool, but not a purpose. During the project development, I conducted a literature search to seek appropriate instructional methods that contribute to the learning objectives. Teaching every mobile technology is impossible because new ones emerge extremely quickly. Therefore, I decided to let students teach themselves through crowdsourcing and peer tutoring.

It was equally difficult to reject an idea as to adopt one. For instance, I came across a concept used to instruct medical professionals called *preparation for future learning* (Mylopoulos & Woods, 2014). I was excited because it seemed useful for designing the project; but the method involves posing increasing challenges to learners, which sometimes ends up in failure. While appropriate for a healthcare learning situation, where patients may keep deteriorating, the method may discourage a computer learner who is having a confidence issue.

The Project's Potential Impact on Social Change

The problem of underusing mobile technologies is common in older adult learners and affects the learning experience of female boomer students in higher education. The Canadian government encourages female participation in the workforce, especially in traditionally male professions, where there is a labor shortage. Therefore, it is beneficial to promote mobile collaborative learning among these students. Because this project is tailored to middle-age students, it cannot mitigate digital divides in the general public. Still, it serves its function in the target population.

Although inability to use a device or software is not always detrimental, the lack of certain competencies will impair function in society. Because female boomer students

in higher education are already leaders, their choices have a major impact. Thus, teaching these students to make informed decisions will, in turn, impact society. The aim of the current project is to achieve this goal, effecting positive social change.

Implications, Applications, and Directions for Future Research

One of the project goals is to prepare students for future learning. Setting a rigid curriculum is impractical due to rapid technological advances. Instead, the course content must be flexible enough to exclude old material and include current material. The proposed project is demanding on both students and teachers and is only intended for mature individuals. Teachers must cultivate a sense of community, which provides intellectual and emotional support among members.

The results of the current research on a gender digital divide among baby boomer students in higher education were inconclusive. Literature on this population is scarce, so further investigations is necessary to clarify the issue. Research on learners pursuing neither higher education nor formal education should have a different focus. If generalizability is an objective, then quantitative research is appropriate. Researchers should also be mindful of big data because multimedia such as images, audios, and videos have become ubiquitous.

There is no standard method to assess computer competency and underuse of technologies. Rapid technological advances quickly render any list of items outdated. In the current research, I looked for missing knowledge and failure to use common technologies, though that information was shrouded, tacit, and subjective. It would be

useful to establish some assessment of computer knowledge that is adaptable to emerging new advances.

Lan et al. (2012) asserted that assessing students' web-based collaborative learning was challenging. Although I have improvised several methods from the literature, they required verification. Because online collaboration has become prevalent, objective and validated assessment systems are needed. The proposed project may apply to different groups of learners after some modifications. Finally, the proposed course may be developed into a MOOC in the future. Further research in these areas is opportune.

Conclusion

I have observed underuse of mobile collaborative learning, even though use of mobile collaborative learning has become a requirement and no longer an option. A lack of knowledge and experience will hamper a person's success. The current project pinpoints the problem and provides a solution.

The research findings indicated that older adults struggled with technology. Despite strong evidence from the literature, whether there was a gender digital divide was still inconclusive. Most of the participants, female boomer students, pursued education for career advancement. They were leaders in their respective fields and skilled computer users. Still, they lacked understanding in cybersecurity, privacy, and cloud computing.

As leaders, their choices regarding the use of technologies were influential. Overly conservative decisions due to the lack of current knowledge diminish competitiveness at the micro-, meso-, and macro levels. I have designed a course to

empower the learners, so they could make informed decisions about technologies. The project addresses the needs of aging computer users. Due to its flexible curriculum, the course is sustainable because learners can adopt the format at any time regardless of technological advances.

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Appendix A: The Project

Introduction

Results of a phenomenological research study revealed female boomer students at a university underused mobile collaborative learning, a technology that would enhance their learning experience. Although the participants were proficient computer users, they needed knowledge reinforcement, especially about cybersecurity, privacy, troubleshooting, problem-solving, and cloud computing. The knowledge would empower learners to make informed decisions regarding technologies in keeping with their leading roles.

To address the need, I propose a training course. The research results indicated that mature students had different requirements from young adults when they learn computer skills. For instance, older learners may not understand some jargon. Also, they need more practice and a hassle-free pace for effective learning.

Unique features tailored for the learners include blended class design, ample practice time, and an inclusive learning environment. Students will learn both mobile technologies and collaboration skills in 16 weeks and earn a full semester credit.

The Proposed Semester Plan

Project Title

Mobile Collaborative Learning for Mature Students -- A Course to Learn Collaborative Skills, Cloud Computing, and Prepare for Future Technological Advances

Purpose

The purpose of the project is to develop competent and confident computer users through comprehension and practice. Students will use their personal SD, learn mobile technologies through practice, and learn collaboration through teamwork. The crowdsourcing and peer tutoring strategies require students to explore their focus and then deliver digital artifacts after researching the topics. Formative evaluations will ensure continuous participation and similar effort among team members. Reflection will be the primary evaluation activity.

Goals

The three project goals are to promote mobile collaborative learning through training, to prepare for future technologies, and to educate students so that they will become informed users. Students will learn to make intelligent decisions about the technologies that align with their roles as leaders in their respective professions.

Learning Outcomes

After attending this course, students will:

- Master collaborative skills using a variety of mobile apps.
- Understand the steps to troubleshoot technical problems, or search for solutions from the web if applicable.

- Understand security and privacy on the Internet and know how to tackle the issues.
- Students will also understand the basics and the future of cloud computing.

Students will research topics of mobile collaboration and gain knowledge in the process. Also, students will post their research on the Internet, contributing to the knowledge pool.

Target Audience

This course offers an opportunity for mature students (age 40 or above) to learn collaborative learning using mobile devices and become a competent cloud user. This course is at an intermediate level. Because all university students have already attained a certain level of computer competency, there is no further prerequisite. The pace and vocabulary will differ from most computer courses designed for millennials.

Components

The three most important components in this course are lectures, practice, and projects. Subject experts invited from the information technology department at the University will give the lectures to provide a solid background in areas that need training, as identified by the research.

Practice. Older adults benefit from practice (Beaunieux et al., 2009; Craik & Bialystok, 2006). With practice, mobile users increase their performance regarding accuracy, speed, and self-efficacy (Cooper, 2006; Wagner et al., 2010). Students must master the operations of different apps using their SD before they can participate in any

projects. In a face-to-face practice session, students ensure they perform the functions correctly and ask technical questions when they arise.

TAs are mentors and resource persons who help students with technical difficulties. TAs will receive training for instructing mature students. For instance, they should avoid excessive use of computer jargons and speak with appropriate speed and volume.

Projects. Students will learn collaborative skills using SD and the cloud through projects which increase in complexity as the course progresses. For instance, students start with an individual project. Then, students using the same operating platform, such as Android or iOS, will work on a project. Finally, users of different platforms will form project groups. The design requires students to overcome compatibility challenge due to different operating systems, which occurs in real life.

Timelines

The course spans a full semester of 16 weeks. Meetings and online collaboration interwove in the course. Overall, lectures and practice sessions occur six times while project time takes up the rest of the semester. The projects will increase in difficulty as students learn essential skills. Time allocated to each project is proportional to the complexity. Below is the term calendar.

Table A1

Term Calendar

Week	Activities
1	1st Meeting: Introduction, lecture, practice
2	2nd Meeting: Lectures, practice
3	3rd Meeting: Practice
4	Project #1: Self study
5	4th Meeting: Practice
6	Project #2: Group project
7	
8	5th Meeting: Lecture, discussion
9	Project #3: Group project
10	
11	
12	Project #4: Group project
13	
14	
15	
16	6th Meeting: Final presentation

Material

Each meeting will take place in a classroom at the University. Tables and chairs will be arranged to accommodate groups of four to six adults who will attend lectures and engage in discussions. The room will be equipped with technologies such as Wi-Fi, a projector or a big-screen TV, connecting cables, and power outlets. The instructor will design the activities for each meeting and provide a laptop or other devices for lectures and announcement. Other equipment such as a whiteboard is optional.

The instructor will upload notes to Blackboard at a time frame that the instructor deems appropriate (before or after a meeting). Students can decide whether print out the notes or read from a device. Students will bring pens and paper for note-taking. Each student and TA will bring an SD.

Throughout the course, students will download apps for working with assignments. I choose Google Apps because Google provides a comprehensive set of apps for most purposes, popular among students, and the apps are free (Brigham, 2014, Brown & Hocutt, 2015). Users can use the same set of username and password to sign in all the apps. Most people have already registered for a Google account, making it easy to adopt.

Once students become familiarized with the apps, they can use their skills for daily applications. Students are encouraged to explore other apps. Acquiring a firm foundation will enable them to adapt new technologies and apps that emerge even after the course is complete.

Blackboard supports class administrative functions. Because the course aims at solving real life problems, it will forfeit the purposes if Blackboard is the only means of communication. To discourage plagiarism, students will submit their assignments via Turnitin.

Activities

Below are the detail plans for the semester. Following the schedule for each meeting are brief descriptions of the activities. The instructor's notes will follow the Activities section.

Week 1: 1st Meeting – Introduction

Schedule:

Time	Activity
08:45 – 09:30	• Check in • Welcome • Course overview • Ice breaker
09:30 – 10:00	Learning objectives and ground rules
10:00 – 10:15	Break
10:15 – 12:00	Lecture: Introduction to cloud computing
12:00 – 13:00	Lunch
13:00 – 15:30	• Practice session • Evaluation: Minute paper • Announcements about next meeting

8:45 – 9:30. Introduction and ice breaker

The instructor welcomes students to the course. The instructor delivers the course overview, which includes courses objectives and aspects of mobile collaborative learning addressed in the course. During the first meeting, students and the instructor get acquainted with each other. The instructor uses an ice breaker (Barkley et al., 2014) to facilitate rapport building.

9:30 – 10:00. Learning objective and ground rules

The three learning objectives of the current meeting are to establish ground rules, to learn the basics of cloud Computing, and to set up SD for future activities. Establishing group norms, shared values, and ground rules is an indispensable step in collaborative learning (Barkley et al., 2014; Nicolson & Uematsu, 2013). Ground rules will ensure the forum is safe and respectful. Results from this research pinpointed good collaboration required a supportive environment, the fair and equal share of effort from each member, and focus on the task.

The instructor asks students to suggest the attributes of a good team and records the suggestions on a whiteboard. Then, the instructor summarizes the discussion, and the results will apply to the ground rules for this group. The instructor will upload the results for everyone's reference.

10:15 – 12:00. Lecture by subject expert: Introduction to cloud computing

A subject expert from the University delivers an introductory lecture to cloud computing. This talk is not technically oriented, but targets at cloud users who may have some experience but may not understand the basics. The lecturer allows adequate time for a questions and answers session during this time frame.

13:00 – 15:00. Practice session

Students bring their SD to this session. TAs introduce themselves and invite students using the same platform to form small groups. "Canada digital future in focus" (2015) reported most Canadians use either Android (50.5%) or iOS (38.3%). Then, students install Gmail, Google +, Google Drive, and Google Calendar on their devices. Although some SD do not support app downloads, students can still participate in all activities using web browsers.

The TA must ensure every student installs the four apps correctly and sign in to each app. TAs gathers every student's username for future projects. At Google +, TAs and students add each other to a circle exclusive for the course. This session is also an opportunity for students to get acquainted with each other.

TAs must appreciate that students are at different levels when using these apps. An inclusive and supportive environment must be maintained to foster learning (Belenky et al., 1986; Cozolino, 2008; Knowles et al., 2005). TAs must ensure students understand the computer terms and allow adequate time for practice.

TAs provide technical support, while the instructor monitors appropriateness and quality of the projects. Students can post their questions on G+ or Blackboard Discussion Board, or they can e-mail their TAs or the instructor in private.

15:00 – 15:30. Closing and assignment

Each student writes a minute paper on a single page, answering the following questions:

1. Describe one (1) take home message from today's meeting
2. Describe one (1) item that you find most challenging

The prompts are the same for all minute paper assignments.

TAs collect and review the paper, noting any problems identified that require immediate attention. TAs also take note of any challenges to an individual student and counsel the student in the next meeting.

Week 2: 2nd Meeting – Lectures and practice

Schedule:

Time	Activity
8:45 – 9:00	• Check in • Learning objectives
9:00 – 10:30	Lecture: Cloud security and password management
10:30 – 10:45	Break
10:45 – 12:00	Lecture: Privacy settings on the web and social media
12:00 – 13:00	Lunch
13:00 – 15:00	Practice session
15:00 – 15:30	• Closing • Evaluation: Minute paper • Announcements about next meeting

Morning session: This meeting is a continuation of Week 1. Subject experts deliver lectures about cybersecurity and privacy. Baby boomers in the research identified these two topics were as the least understood.

Afternoon session: Students discuss with TAs about last week's apps and troubleshoot if needed. Students download Google Doc, Google Sheet, and Google Form apps. TAs must ensure every student installs the apps correctly and sign in to each app.

Assignment: Students can choose to write their minute paper on paper or online. Each student receives a link to a Google Form, where they answer the prompts. The maximum length for each answer is 125 words. Students must submit before the end of Week 2 if they choose the online method.

Week 3: 3rd Meeting – Practice session

Schedule:

Time	Activity
8:45 – 9:00	• Check in • Learning objectives
9:00 – 12:00	Practice session • Reflect and troubleshoot with TA • Start working with Project #1 • Announcements about next meeting

Practice: Students should utilize the time when a TA is available to answer technical questions. Students are also encouraged to discuss with fellow students, and they can start working on Project #1. Although students should use an SD in this course, it is acceptable for students to type their assignment with a laptop or desktop.

Assignment: Students must submit the minute paper online. Each student receives a link to respond with a Google Form. The deadline is the end of Week 3.

Project #1

Details of the project are posted both on G+ and Blackboard. Students work individually on this project following the instructions and rubrics. Each student will

suggest one technical question the student always wanted to answer about the device, for instance, how to turn on the flashlight on the smartphone.

Week 4: Project

Presentation of research results: Each student writes a short paper (guided by instructions and prompts) to describe the solution and at least two ways to find out the solution (for example, asking another person and using Google search). Students must post this paper on the class G+ before the end of Week 4.

Collaboration: Each student respond (comment or ask questions) at least twice to fellow students' posts. Students are encouraged to use references to support their perspectives. Each response must be substantive, a mere "yes", "no", or "good" is not acceptable as a response.

Evaluation: Each student will submit a short essay (Guided by instructions and rubrics) via Turnitin before the end of Week 4. In additional to preventing plagiarism, the student's personal reflection is kept private (Coulson & Harvey, 2013) when the assignment is submitted via the University portal.

Week 5: 4th Meeting – Practice

Schedule:

Time	Activity
8:45 – 9:00	• Check in • Learning objectives
9:00 – 12:00	Practice session • Reflect and troubleshoot with TA • Start working with Project #2 • Announcements about next meeting

Practice: In this session, students will download Google Hangout for video chat. They will download YouTube, where they can watch videos and upload videos.

Formation of groups: Each group consists of three to four students, preferably using the same platform.

Project #2

Definition of research problem: Each group identifies one question about current mobile technologies. Examples of research questions include: How do app developers make a profit? What are the differences between an app and a program? What are the differences between a tablet and a laptop?

Presentation of research results: Each group will research the question and present the results in a group report. During the process, group members will work on the same share file (such as Google Doc) and use instant messaging if needed. Each group posts their completed project on G+ before the end of Week 7.

Week 7

Collaboration: Each student comment on the posts. They should post their response at least twice before the end of Week 8.

Evaluation: Each student grades and comments anonymously on the performance of every member in the same group (guided by instructions and rubrics). The assessment measures student input to the project and ensures contribution (Janssen & Bodemer, 2013; Lan, Lin, & Hung, 2012; Tsipursky, 2014).

Week 8: 5th Meeting – Lectures and discussions

Schedule:

Time	Activity
8:45 – 9:00	• Check in • Learning objectives
9:00 – 10:45	Lecture: The future of mobile technologies
10:45 – 11:00	Break
11:00 – 12:15	Discussion
12:15 – 12:30	Closing

Lecture: An expert speaks of the future of mobile technologies. By this time, students have gained knowledge and experience with current mobile technologies. While students focus on Web 2.0, they should be vigilant that Web 3.0 and Web 4.0 have become increasingly important (Aghaei, Nematbakhsh, & Farsani, 2012). Therefore, users must keep updated to meet the challenges brought about by emerging technologies.

Discussion: Students discuss in groups to summarize what they learned from this course. They also suggest areas of improvement for the following weeks. Representatives from

each group present the comments to the class, while the instructor consolidates the results and posts on G+.

Project #3

Students will form groups for Project #3. Members can use the same or different platforms. This project consists of three short collaboration assignments:

1. Each group will explore presentation apps other than PowerPoint and comment on the pros and cons of a minimum of two apps.
2. Each group will explore collaborative apps and comment on the pros and cons of a minimum of two apps.
3. Explore productivity apps and comment on the pros and cons of a minimum of two apps.

Each group posts reports on G+ before the end of Week 11, while each student responds before the end of Week 12. Each student must submit the performance appraisal of every group member by the end of Week 11. The processes of posting reports, collaboration, and evaluation are the same as Project #2.

Preparation for Project #4

Steps:

1. Students suggest several complicated research questions about mobile technology.
2. Students choose four problems by casting votes on the suggestions.
3. Students form four groups for Project #4. There will be no restrictions in the platforms.

Week 12: Project #4

At this point, students can organize their work completely online. Although they can opt for meeting in person, there are no planned meetings until Week 16. Students are encouraged to use collaborative and instant messaging apps to coordinate their activities.

Collaboration: Each group works on one problem chosen from the vote.

Presentation of research results: Each group posts the completed project on G+ and prepares a presentation.

Evaluation of collaboration: Each student grades and comments on the performance of every group member. The deadline is end of Week 16.

Evaluation of individual learning: Each student submits a short reflective essay via Turnitin by the end of Week 16.

Week 16: 6th Meeting – Final presentation

Schedule:

Time	Activity
8:45 – 9:00	• Check in • Learning objectives
9:00 – 9:30	Presentation 1
9:30 – 10:00	Presentation 2
10:00 – 10:30	Presentation 3
10:35 – 10:45	Break
10:45 – 11:15	Presentation 4
11:15 – 13:00	• Discussion and reflection • Closing

Presentation. Each group presents the completed projects while the class comments. Each presentation lasts 15 minutes. The remaining 15 minutes is discussion time.

Students learn collaborative skills and mobile technologies in 16 weeks. The presentations demonstrate the results of teamwork and use of cloud computing. With the consent of the students, the research papers will be posted online to add to the knowledge pool.

Discussion and reflection. The learning objectives and activates for this session are:

- Reflect on the apps used in this course – students discuss in groups to reflect how well they use the apps, how useful they find the apps, and other apps they explored in the course.
- Reflect on the growth of collaborative skills – students discuss in groups to reflect how much they learn about collaborative skills. A representative from each group will present the findings in 1 – 2 minutes.
- Discuss how the knowledge enhances professional practice or use of mobile technologies for work, study, and personal use – students discuss in groups to tell their stories. A representative from each group will present the findings in 1 – 2 minutes.
- Reflect the development into an informed user – students will discuss in groups, but no public presentation. Students may reflect deeply and honestly if the information is contained in small groups.

Closing. The course leader congratulates students for their hard work and their emergence as expert mobile users. The 16-week course is complete.

PowerPoint: 1st Meeting

Mobile Collaborative Learning for Mature Students

A Course to Learn Collaborative Skills, Cloud Computing, and Prepare for Future Technological Advances

Welcome

University of Toronto

Course leader – Prof. ABC

Target audience

- Mature students vs. millennials

Course overview

- Course objectives
  - To promote mobile collaborative learning through training
  - To prepare the students to adopt future technologies
  - To educate students so that they will become informed users
- Course outcome: After this course, you will
  - Master collaborative skills using a variety of mobile apps.
  - Understand how to troubleshoot technical problems, or search for solutions
  - Apply security and privacy settings
  - Understand the basics and the future of Cloud computing

Collaborative Skills

- A requirement, not an option
  - At school and at work
- Collaborative learning
  - Fosters learning experience
  - Back channel of communication vs. formal communication
  - Cooperative learning vs. collaborative learning
  - Face-to-face and online

Mobile Collaborative learning

- Cloud computing: Apps
- Mobile Smart Device (SD)
- Different mobile platforms
  - Android
  - IOS
- Challenges to work with different platforms
  - Compatibility issues
  - Different interfaces

In this course, we will deal with these through practice

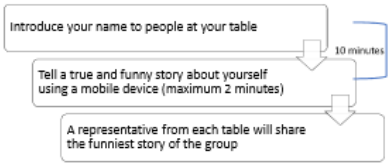
Course Components

Lectures
- Basic knowledge: Different aspects of Cloud computing

Practice
- Apps in your smart device (SD)

Projects
- Collaborative skills
- Research to enrich knowledge

Introduce yourselves



Today's Learning Objectives

- What makes a good team?
  - Negotiate a set of ground rules
- Lecture
  - Learn basic knowledge about cloud computing
- Practice
  - Download apps required for the course
  - Sign up and logon to each app
  - Practice with each app

Group Norms & Shared Values

What makes a good team?

Break

Resume 10:15 a.m.

Introduction to Cloud Computing

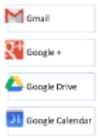
Professor X

Lunch

Resume 1 p.m.

Practice Session

- Your teaching assistants
  - Identify your mobile platforms
  - Android/iOS/others
- Practice
  - Download the apps
  - Sign in to each app
  - Practice with each app
- Submit your Gmail address for future class activities



Assignment Before You Leave

1. Describe one (1) take home message from today's meeting
2. Describe one (1) item that you find most challenging

- Maximum one (1) page in total
  - Make sure your name is on the paper
- This assignment is required

If You Encounter Problems

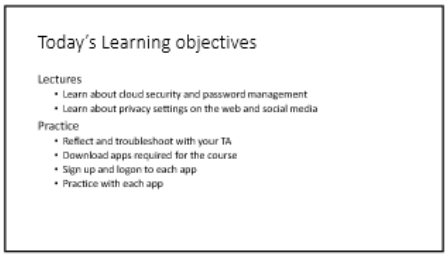
- For urgent questions, ask for help by:
  - Posting your question in the Class G+
  - Posting your question in the Blackboard discussion board
  - Emailing your TA if you prefer private discussions
- Discuss with your TA or fellow students at the next meeting

Next Meeting

Lectures
- Learn about cloud security and password management
- Learn about privacy settings on the web and social media

Practice
- Reflect and troubleshoot with your TA
- Download apps required for the course
- Sign up and logon to each app
- Practice with each app

PowerPoint: 2nd Meeting

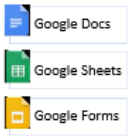


Afternoon Session

- Housekeeping
- Assignment
- Practice

Practice Session

- Practice with the apps that you may need help
- Practice
  - Download the apps
  - Sign in to each app
  - Practice with each app



Assignment for this meeting

1. Describe one (1) take home message from today's meeting
2. Describe one (1) item that you find most challenging

- This assignment is required

Assignment for this meeting

- Submit either on paper or online, don't duplicate
- Paper: Maximum one (1) page in total
  - Make sure your name is on the paper
  - Submit to your TA before you leave today
- Online: Maximum 125 words per question
  - Link to the assignment – sent to your Gmail
  - Complete within three (3) calendar days from today

If You Encounter Problems

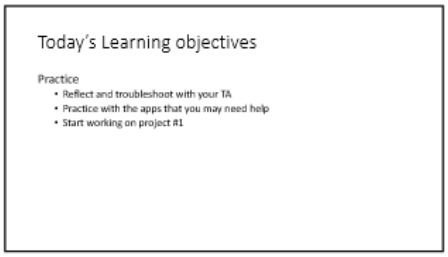
- For urgent questions, ask for help by:
  - Posting your question in the Class G+
  - Posting your question in the Blackboard discussion board
  - Emailing your TA if you prefer private discussions
- Discuss with your TA or fellow students at the next meeting

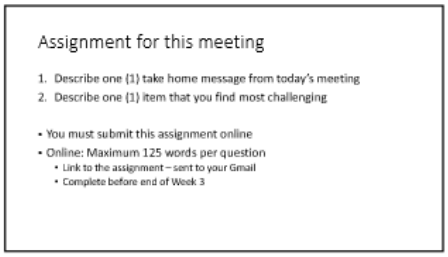
Next Meeting

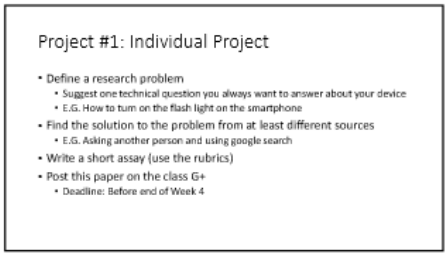
Practice
- Reflect and troubleshoot with your TA
- Download apps required for the course
- Sign up and logon to each app
- Practice with each app

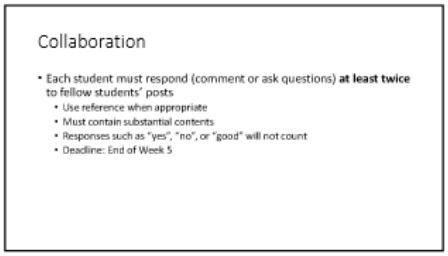
- Project
  - Start working on Project #1

PowerPoint: 3rd Meeting









Evaluation

- Each student will submit a short reflective essay (Guided by instructions and rubrics) via Turnitin
  - Deadline: End of Week 4

Details

- Details of this project is posted on
  - Class G+
  - Blackboard

If You Encounter Problems

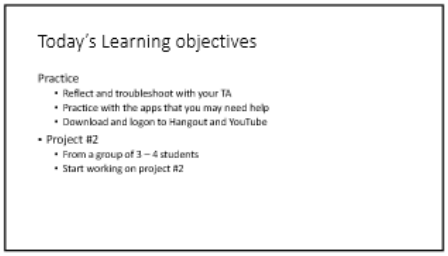
- For urgent questions, ask for help by:
  - Posting your question in the Class G+
  - Posting your question in the Blackboard discussion board
  - Emailing your TA if you prefer private discussions
- Discuss with your TA or fellow students at the next meeting

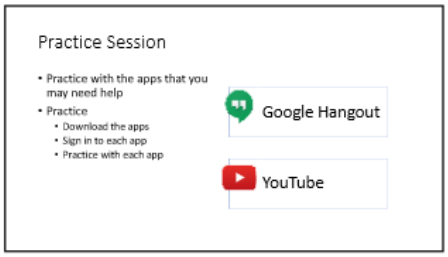
Next Meeting

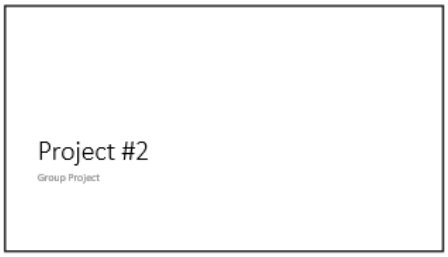
Practice
- Reflect and troubleshoot with your TA
- Download apps required for the course
- Sign up and logon to each app
- Practice with each app

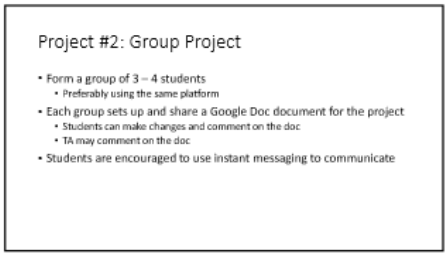
- Project #2

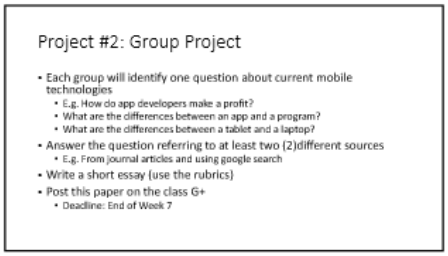
PowerPoint: 4th Meeting











Collaboration

- Each student must respond (comment or ask questions) **at least twice** to fellow students' posts
  - Use reference when appropriate
  - Must contain substantial contents
  - Responses such as "yes", "no", or "good" will not count
  - Deadline: End of Week 8

Evaluation

- Each student will grade and comment on the performance of every group member (guided by instructions and rubrics) via Google Form
- Link to Google Form – sent to your Gmail
  - Deadline: End of Week 7

Details

- Details of this project is posted on
  - Class G+
  - Blackboard

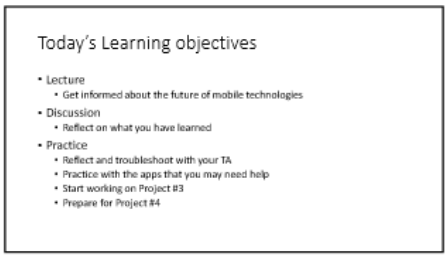
If You Encounter Problems

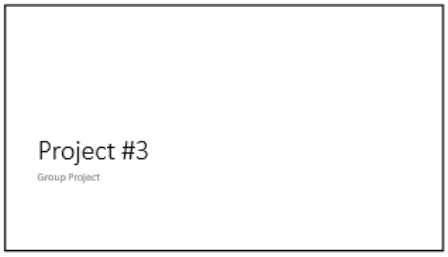
- For urgent questions, ask for help by:
  - Posting your question in the Class G+
  - Posting your question in the Blackboard discussion board
  - Emailing your TA if you prefer private discussions
- Discuss with your TA or fellow students at the next meeting

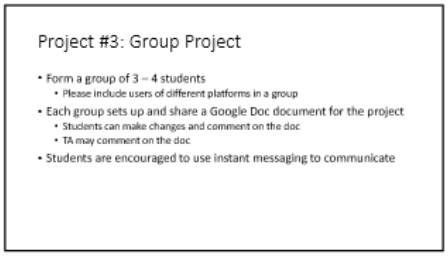
Next Meeting

- Lecture
  - The Future of Mobile Technologies
- Practice
  - Reflect and troubleshoot with your TA
  - Download apps required for the course
  - Sign up and logon to each app
  - Practice with each app
- Project
  - Start working on Project #3
  - Prepare for Project #4

PowerPoint: 5th Meeting







Group Project: Collaborative Assignments

1. Each group will explore **presentation apps** other than PowerPoint and comment on the pros and cons of a minimum of two apps.
   - E.g. Prezi
2. Each group will explore **collaborative apps** and comment on the pros and cons of a minimum of two apps.
   - E.g. Slack
3. Explore **productivity apps** and comment on the pros and cons of a minimum of two apps.
   - E.g. Evernote

Group Project: Collaborative Assignments

- Submission
  - Each group will post completed assignment on the class G+
  - Deadline: **End of Week 11**
- Collaboration
  - Each student must respond (comment or ask questions) at least twice to fellow students' posts by the **end of Week 12**
- Evaluation
  - Each student will grade and comment on the performance of every group member via google form by the **end of Week 11**
  - Link to google form – sent to your Gmail

Project Details

- Details of this project is posted on
  - Class G+
  - Blackboard

Preparation for Project #4

Group Project

Final Project: Preparation

- Suggest several complicated research questions about mobile technology
- Choose four (4) problems
  - Cast votes on the suggestions
- Students form four (4) groups for project #4
  - No restrictions in the platform

Final Project:

- Submission
  - Prepare a presentation of the completed research
  - Each group will post completed assignment on the class G+ by the **end of Week 15**
- Collaboration
  - Each student must respond at least twice to fellow students' posts by the **end of Week 16**
- Evaluation
  - Each student will grade and comment on the performance of every group member via google form by the **end of Week 15**
  - Link to google form – sent to your Gmail

Project Details

- Details of both projects are posted on
  - Class G+
  - Blackboard

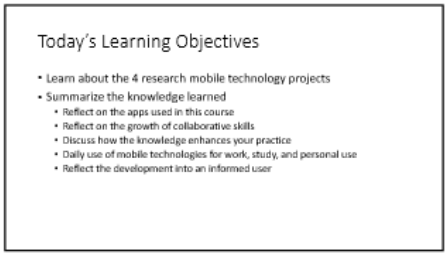
If You Encounter Problems

- For urgent questions, ask for help by:
  - Posting your question in the Class G+
  - Posting your question in the Blackboard discussion board
  - Emailing your TA if you prefer private discussions
- Discuss with your TA or fellow students at the next meeting

Next Meeting

- Presentations
  - Each group will present their project
- Discussion and reflection
- Celebrate!

PowerPoint: Final meeting



Presentation 4

Group 4

Discussions: What we learned in this course

- Reflect on the apps used in this course
- Reflect on the growth of collaborative skills
- Discuss how the knowledge enhances your practice
- Daily use of mobile technologies for work, study, and personal use
- Reflect the development into an informed user

Apps Used in This Course: Group Discussion

- How well can I use the apps?
- How useful are the apps?
- Other apps that I explored

Gmail
Google +
Google Drive
Google Calendar
Google Docs
Google Sheets
Google Forms
Google Hangout
YouTube

The Growth of Collaborative Skills

- Group discussion
- Short discussion of summary
  - Representative from each group

Application of Knowledge in Real Life

At **work** or **personal** life

- Group discussion
- Short presentation of stories
  - Representative from each group

The Development Into an Informed User

- Discussion within groups

Implementation Plan

To reach the target audience, I will communicate the project to the University's Provost Office. The University can offer the course to mature students, aged 40 or above (Brummel-Smith, 2013), who want to update their knowledge. Students will use free Google Apps for the assignments (Brigham, 2014), while the university will provide access to the Internet via Wi-Fi.

To deliver basic information, I will invite subject experts to lecture on different topics. Other required resources include a teaching management system (Blackboard) and TAs. Because most TAs are young, they should be mindful when using computer jargon and allow ample practice time for older learners.

Students will identify knowledge gaps or problems regarding mobile collaborative learning, research the gaps or problems, then present to the rest of the class. During the process, students will learn to work with SDs with the assistance of peer tutoring. Also, students will learn collaborative skills in group projects. The teacher will be a facilitator

who plans and facilitates the learning activities (Akella, 2012). Due to the fast emergence of new technologies, the teacher will be a co-learner rather than a supplier of knowledge, and TAs will provide technical guidance. Students, teachers, and TAs will form a learning community and develop together.

Evaluation Plan

Project evaluation. This assessment will follow university benchmarks. The evaluations may include student grade, retention rate, student survey, and faculty feedback.

For each lecture, the University will employ a standard questionnaire for evaluation. Questions asked including lecturer knowledge, clarity, and instructional techniques; content appropriateness; and student satisfaction.

Evaluating student learning. Throughout the course formative evaluation will be used to assess the quality and quantity of participation and learning. Teachers will use descriptive rubrics, a list of concise and objective grading criteria (Suskie, 2009), to ensure timely feedback. Written reflections will be the primary assessment method (see Table A2).

The challenge in assessing student online learning is twofold. While participation is a good yardstick, teachers also need to evaluate the quality of work. In this course, students will post their research projects to G+ while fellow students will comment. For group work, students will grade and comment on each project member anonymously (Janssen & Bodemer, 2013; Lan, Lin, & Hung, 2012; Tsipursky, 2014). Finally, students will reflect on their work, either by writing a minute paper or a short essay.

Group and individual reflection are both relevant to the course. Students will post their research online for comment by fellow students. The interactions are products of reflection (Garrison & Kanuka, 2004; Rogers, 2001; Ryan, 2013; Williams & Jacobs, 2004). Individual reflection, however, will be kept private to avoid exploitation (Coulson & Harvey, 2013).

Table A2

An Overview of Learning Evaluation in the Proposed Course

Evaluation method or activity	Practice using mobile apps	Individual projects	Group projects
Self-assessment (minute paper, reflective essay)	X	X	X
Comments by the whole class (G+)	X	X	X
Assessment by fellow group members			X
Presentation			X
Digital artifacts posted online (public)		X	X

Multiple assessments throughout the course ensure continuous learning effort from the students and timely feedback. Because the main goal is understanding, students tackle many small tasks where they practice their skills. Various methods assess how well the students learn. All the assignments include clear instructions and rubrics.

The prompts in an assignment must match the rubrics to ascertain accurate and fair assessment, which is especially important for multiple assessors. Below, I have included an assignment and rubrics as an example of the evaluation.

The following reflective assignment is derived from Ryan's 4 levels of reflections: (1) reporting and responding, (2) relating, (3) reasoning, and (4) reconstructing (2013).

Assignment: Reflecting on Project #4

In this assignment, reflect on one (1) aspect of Project #4 that impacted you most. You may receive bonus points if you bring additional reflections on other areas. Use references and examples where appropriate. Write in conjunction of the rubrics. Remember to submit to Turnitin by the end of Week 16.

Use the following prompts as a guideline to write an essay in 750 – 1000 words.

1. Project #4
    a. State the project title
    b. Briefly use one or two sentences to describe each of the following: Background, purpose, research method, result, and conclusion.
    c. Why did the group choose this topic?
    d. How did the topic apply to you personally? Discuss how and why the topic was either applicable or inapplicable.
    e. What were the lessons learned? It could be related to mobile technologies, or collaboration, or both.
2. Application of knowledge
    a. How will you apply the knowledge in the future?
    b. What resources are needed?
    c. What are the perceived barriers?

3. What would you have done differently?
4. Please suggest a scenario for you to apply your knowledge, and briefly, describe your action plan.
5. Please discuss any additional thoughts, if applicable (bonus points apply).
6. Conclusion

Rubrics

Item	Points	Descriptions
1a. Project title (max. 1 pt.)	1	Correct title
	0	Incorrect title/title missing
1b. Brief description of project (max. 5 pts.)	5	Excellent: All elements listed in the prompts were present with clearly descriptions
	4	Good: All elements listed were present. One or two descriptions were unclear
	3	Suboptimal: All elements listed were present, but descriptions were unclear, or Suboptimal: One or two elements were missing, despite clear descriptions of the remaining elements
	2	Poor: Only one or two elements were present, despite clear descriptions of the remaining elements
	1	Poor: Only one or two elements were present and descriptions were unclear
	0	This prompt was not answered
1c. Why did the group choose this topic? (max. 2 pts.)	2	Clear, logical explanation
	1	Explanation unclear, or not presented logically
	0	This prompt was not answered
1d. How did the topic apply to you personally? (max. 3 pts.)	3	Excellent: Clear, logical, coherent discussion that refers to the author
	2	Good: Described the relationship
	1	Poor: Unacceptable discussion, either unclear, illogical, or incoherent
	0	This prompt was not answered
1e. What were the lessons learned? (max. 3 pts.)	3	Excellent: Clear, logical, coherent discussion
	2	Good: Described and discussed the lessons
	1	Poor: Unacceptable discussion, either unclear, illogical, or incoherent
	0	This prompt was not answered

2a. How will you apply the knowledge in the future? (max. 3 pts.)	3	Excellent: Clear, logical, coherent discussion
	2	Good: Described and discussed the prompt
	1	Poor: Unacceptable discussion, either unclear, illogical, or incoherent
	0	This prompt was not answered
2b. What resources are needed? (max. 3 pts.)	3	Excellent: Identified the resources with clear explanation
	1	Suboptimal: Identified the resources but explanation was unclear
	0	Poor: Mentioned resources without giving explanation
	0	This prompt was not answered, or content was incomprehensible
2c. What are the perceived barriers? (max. 3 pts.)	3	Excellent: Identified the barriers with clear explanation
	1	Suboptimal: Identified the barriers but explanation was unclear
	0	Poor: Mentioned barriers without giving explanation
	0	This prompt was not answered, or content was incomprehensible
3. What would you have done differently? (max. 3 pts.)	3	Excellent: Suggested alternative solution to the problem in a clear, logical, and coherent manner. Content supported by references or examples
	2	Good: Suggested alternative solution to the problem. Content supported by references or examples
	1	Suboptimal: Suggested alternative that were not convincing Suboptimal: Content not supported by references or examples
	0	Poor: Failed or did not attempt to answer the prompt
4. Action plan (max. 5 pts.)	5	Excellent: Clear, logical, and coherent description of both the scenario and action plan. Content supported by references or examples
	4	Good: Both the scenario and action plan were described. Content supported by references or examples
	3	Acceptable: Both the scenario and action plan were described, but one item was unclear, illogical, or incoherent. Content supported by references or examples
	2	Suboptimal: Either the scenario or action plan were not convincing. Content supported by references or examples

		Suboptimal: Both the scenario and action plan were described. Content not supported by references or examples
	0	Poor: Either the scenario or action plan was not convincing. Poor: Content not supported by references or examples
	0	Poor: Failed or did not attempt to answer the prompt
5. Additional thoughts (max 3 bonus pts.)	3	Excellent: Clear, logical, and coherent discussion. Content supported by references or examples where appropriate
	2	Good: Relevant discussions. Content supported by references or examples where appropriate
	1	Suboptimal: Discussions not convincing
	0	This prompt was not answered
6. Conclusion (max. 5 pts.)	5	Excellent: Clear, logical, and coherent conclusion based on previous discussions
	4	Good: Convincing conclusion based on previous discussions
	3	Acceptable: Convincing conclusion
	2	Unacceptable: Conclusion was unclear or unreliable
	1	Poor: Conclusion was not based on previous discussion
	0	This prompt was not answered
Grammar (max. 3 pts.)	3	Excellent: No or very few grammatical mistakes or typos (0-3)
	2	Acceptable: A few grammatical mistakes or typos (3-6)
	1	Suboptimal: Some grammatical mistakes or typos (6-10)
	0	Poor: Many grammatical mistakes or typos (> 10)
Citation, including correct referencing style (max. 3 pts.)	3	Excellent: Correct use of citations where appropriate
	2	Acceptable: Correct use of citations where appropriate except in 1 occasion
	1	Suboptimal: Did not provide citations in 2-3 occasions
	0	Poor: Did not provide citations in more than 3 occasions Poor: No citation
Use of examples (max 3 bonus pts.)	3	Excellent: Correct use of examples where appropriate
	1	Acceptable: Used some examples correctly except in more than 1 occasions

	0	Poor: Did not provide example where needed
Reference list, including correct style (max. 3 pts.)	3	Excellent: Reference list was complete and corresponding to citations
	1	Suboptimal: Reference list was incomplete and not corresponding to citations in more than 1 occasion
	0	Poor: Reference list was missing Poor: Reference list did not correspond to citations in more than 2 occasions

Appendix B: Permission to the use of a Diagram (Figure 2)

RightsLink

Copyright Clearance Center

Thank You For Your Order!

Dear Ms. Holly Chun,

Thank you for placing your order through Copyright Clearance Center's RightsLink service. Elsevier has partnered with RightsLink to license its content. This notice is a confirmation that your order was successful.

Your order details and publisher terms and conditions are available by clicking the link below:

Order Details
Licensee: Holly Chun
License Date: Nov 15, 2012
License Number:
Publication: Trends in Cognitive Sciences
Title: Cognition through the lifespan: mechanisms of change
Type Of Use: reuse in a thesis/dissertation
Total: 0.00 USD

To access your account, please visit https://myaccount.copyright.com.

Please note: Online payments are charged immediately after order confirmation; invoices are issued daily and are payable immediately upon receipt.

To ensure we are continuously improving our services, please take a moment to complete our customer satisfaction survey.

Appendix C: Flyer for Participant Recruitment

Appendix D: Approval from the Provost's Office of the research site

March 27, 2015

Ms. Holly Chun
[redacted]

Copy sent via e-mail to: [redacted]

Dear Ms. Chun,

Re. Mobile collaborative learning for female baby boomer students in Canadian Higher Education

Thank you for providing your request to access students for research purposes (as outlined in the *Provost's Guidelines on Access to Faculty, Students and Staff for Research Purposes*), the outline of your proposed research project, confirmation of your ethics review from the [redacted] and your signed confidentiality agreement to the Office of the Vice-Provost, Students & First-Entry Divisions.

On behalf of the Vice-Provost, Students & First-Entry Divisions, I am pleased to confirm that you may have access to [redacted] students for the purpose of your study.

I note that in your study, students will sign a letter of informed consent prior to participating.

You may also wish to note that our office does not grant permission for the deployment of divisional/departmental staff and resources to access students and student information, nor can we permit the use of institutional resources to recruit participants for your study (e.g. sending out an e-mail to all students on your behalf). You may wish to pursue alternative methods to recruit participants, like postering, and other pre-existent networks to contact students (e.g. facebook groups, student society listservs, etc.). If you intend to use divisional or departmental staff and resources to collect data, please contact the relevant division or department directly.

Please accept my best wishes for your research endeavours.

Yours sincerely,

Appendix E: Interview Protocol

Thank you for participating with this research. This is a coffee shop gift card to show appreciation of your time and effect ***(hand gift card to participant)***. Here is your participant card ***(hand card to participant)***. Please use the alias on this card for responding to the reflective questionnaire.

Before we start the interview, please watch an introduction of the research ***(show the presentation using iPad).*** Link to the presentation: http://prezi.com/6fdqshklcty6/?utm_campaign=share&utm_medium=copy&rc=ex0share Now we can start the interview. I will audiotape the whole process. ***Turn on recorder.***

Participant #: _____ **Alias:** _____

Date: _____ **Time:** _____

Venue: _____

During the interview, you can skip any questions, stop the interview at any time, or even quit the study at any time. There is no obligation.

First, please tell me your year of birth.

1. Please briefly describe this picture and tell me why you choose to submit it.
2. Do you prefer studying alone or with fellow students? Why?
3. Some people think females and older adults are less proficient in using the computer and internet. Do you agree with this belief? Why or why not?

4. How do you describe your computer skills? In a 10-point scale, a computer naïve scores 1 and a computer savvy scores 10. How many points would you give yourself? Why do you think so?

5. How do you use your computer skills for learning and personal purposes?

6. Do you use social networking software, for example, Facebook, Twitter?

7. What device(s) do you use for social networking? Do you use a laptop or desktop? Do you use a smart device such as a smartphone or a tablet, or all of them?

8. Do you learn by collaborating with your fellow students online? Why or why not? Please describe your experience, if any.

This is the end of the interview. Thank you very much! ***Turn off recorder.*** Do you know anyone who can share their experiences with me? Can you refer them to this research? Thanks again.

Appendix F: Reflective Questionnaire

Attention: Holly Chun

Re: Mobile Collaborative Learning in Female Baby Boomer Students in Canadian Higher Education

Fax to:
Holly Chun

Mail to:
Holly Chun

Email:

Your alias: _____

Dear participant,

Thank you for filling out this questionnaire. Please reply **within two weeks** after the interview.

Instruction: To each of the questions 1 to 5, please choose **one** of the choices: "Strongly agree", "Agree", "Disagree", "Strongly disagree", and "Not applicable/prefer not to tell".

	Strongly agree	Agree	Disagree	Strongly disagree	Not applicable/ prefer not to tell
1. Mobile collaborative learning is a useful strategy for me.	☐	☐	☐	☐	☐
2. I prefer learning with peers than studying alone.	☐	☐	☐	☐	☐
3. I am interested in collaborative learning through online social networking.	☐	☐	☐	☐	☐
4. I have experience in mobile collaborative learning.	☐	☐	☐	☐	☐
5. I would like to learn more about mobile collaborative learning.	☐	☐	☐	☐	☐

Please supply short answers to the questions below:

6. After the interview, are there any changes of your perception about mobile collaborative learning? If yes, how? If no, why?

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7. Do you have anything else you would like to share?

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8. Please indicate if I can contact you for follow-up? ☐ Yes ☐ No

End of questionnaire. Thank you!