"I am not computer savvy": A look into the everyday digital literacy levels of formerly incarcerated people using a novel holistic digital literacy framework

Lassana MAGASSA

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Reading Committee:

Karine Nahon, Co-chair
Michael Eisenberg
Ricardo Gomez (in place of Allyson Carlyle), Co-chair

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Abstract

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Lassana MAGASSA

Co-Chairs of the Supervisory Committee:
Dr. Karine Nahon, Affiliate Associate Professor
The Information School

Dr. Allyson Carlyle, Professor
The Information School

This dissertation explores the Everyday Digital Literacy (EDL) of formerly incarcerated individuals using an EDL framework-based self-assessment questionnaire (SAQ). The research proceeded as follows: conceptualize an EDL framework (EDLF) based on the current consensual definition of digital literacy existent in the literature; identify and evaluate shortcomings of the EDLF; design a unique holistic EDLF addressing results of critique, namely, the absences of a concept of everydayness characteristic of digital literacy overall, as well as of three key descriptive constructs: knowledge, social behavioral, and affective. Validity of EDLF grounding development of the finalized 169 item SAQ was established through a series of closed card sorts executed by 35 participants recruited from information related professions. Three focus groups of 12 members comprised of formerly incarcerated persons, and conversations with subject related researchers were conducted to improve structural clarity, content, and reliability of the instrument. Finally, the instrument was completed by 36 formerly incarcerated individuals released no later than 150 days prior their EDL assessment.

This research makes theoretical, methodological, and empirical contributions. Theoretically, the EDLF provides a unique, holistic comprehensive realization of EDL practices as increasingly embedded in and characteristic of our 21st century life worlds. Methodologically, the participation of formerly incarcerated individual in the development of EDL SAQ demonstrates the flexibility of the validated EDLF as well as extensibility of SAQ to a variety of subject populations. The empirical grounding of research findings provides criminal justice related domains with evidence-based information to guide inclusive policy decisions that increase preparedness of formerly incarcerated individuals for encounter and engagement with digital spaces immediately upon their release. Most importantly, the acquisition, continual learning, and practice of EDL increases exposure to perceivable affordances mobilized through awareness, knowledge, and conduct in contemporary digitally embedded life worlds.

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In the name of Allah, the Most Gracious, the Most Merciful. All Praise and Glory is due to Allah, Lord of the Worlds. The Most Gracious, the Most Merciful. Master of Judgement. It is You that we worship and is Your aid that we seek. Guide us to the straight path. The path of those upon whom you have bestowed your favor, not the path of those who have earn Your angry nor the path of those who go astray.

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1 About this research

1.1 Introduction

Digital technology affects every aspect of people's lives. It has transformed how people communicate (Greenwood, Perrin, & Duggan, 2016), learn (Meyers, Erickson, & Small, 2013), and work. It has positively influence the health outcomes of individuals with chronic illnesses (Aguilera & Lyles, 2017). Digital technology is used to make shopping decisions—eight-in-ten Americans now shop online (Smith & Anderson, 2016). According to a 2016 Pew report, seventy-nine percent of people in America have made an online purchase with 15% making a purchase through a social media site. Digital technology is being used to get news and interact with others. Another Pew study on social media platforms found that 68% of U.S. adults are Facebook users, and 28% use Instagram, 26% use Pinterest, 25% use LinkedIn and 21% use Twitter (Greenwood, Perrin, & Duggan, 2016).

The plethora of digital technologies available, the presence of technology in all contexts of life, and the constantly evolving digital landscape come with challenges. For example, Allcott & Gentzkow (2017) found that over fifty-percent of people who saw fake news stories online believed them. Olmstead and Smith (2016) found that a significant proportion of the U.S. population do not always employ security best practices to protect their digital lives. Digital technologies vary in form, size, affordability, and capability. They are used to perform a variety of tasks including managing personal finances to sending and receiving data across the Internet. Digital technologies are increasingly integrated into everyday activities, built environments, such as supermarkets, households, social networking platforms, transportation, postal, and security systems, not to mention security systems. Being able to navigate this evolving landscape requires more than access to a robust digital infrastructure or owning digital technologies; it requires individuals to be digitally literate.

How we understand ourselves in relation to our engagements with others in a variety of environments and situations – although different – is increasingly mediated by our interactions with a variety of digital technologies, of which awareness and knowledgeable uses motivate and negotiate the engagements themselves. That is to say, information of every kind and purpose exists or likely will exist in digital form in the course of the 21st century. This includes information relating "to insurance, social services, utilities, real estate, leisure and travel, credit arrangements, employment, education, law, as well as personal information for identification and qualification, such as birth certificates, drivers' licenses, passports, marriage certificates, etc" (Gere, 2009, p. 14). The stakes are high for all of us navigating the digital landscape for survival throughout the 21st century.

1.2 Problem statement

Researchers agree that individuals with higher levels of digital literacy are able to use technology to interact with the world in ways that other individuals cannot. However, what constitutes as digital literacy can vary from one researcher to the next. To date, very few frameworks of digital literacy have been put forth. Of those that do exist, even fewer claim to be holistic representations of what it means to be digitally literate. Although there are frameworks that claim to be holistic, one significant limitation is that none of them provide robust representations of the social behavioral construct of digital literacy. Another limitation of most conceptual representations of digital literacy is that it they do not fully explore the relationship between feelings and emotions and digital literacy levels. Another limitation of current frameworks is that the cognitive constructs do not capture the fact that there are digital technology support and replace certain forms of human cognition, such as remembering. This research

will address these gaps in the existing literature. The research problem therefore is to develop a holistic conceptual representation of digital literacy that accounts for the social behavioral and affective constructs, as well as extends current conceptions of the cognitive construct.

There is a virtually unanimous agreement that digital literacy is necessary for all individuals to survive and prosper in the 21st century. However, many groups of individuals have significant barriers to attaining a level of digital literacy that will support success in a digital environment. A group that may face more barriers than any others are incarcerated individuals re-entering society. Over 95 percent of incarcerated individuals in the U.S. will exit prison to encounter a society that looks extremely different from the one they left when they entered prison. Most of these individuals had less than a high school education and were unemployed when they were incarcerated. Based on existing research on the general public, to increase the likelihood that individuals leaving prison will be able to successfully transition from prison back into communities that necessitate the use of digital technology, they should have used digital technology and participated in programming that encouraged their use. Doing so would increase the likelihood that individuals would have sufficient levels of digital literacy on their date of release. Currently, we know very little about the rate of digital technology penetration in prisons, and if and how incarcerated individuals are using them. We do know that re-arrest rates after leaving prison has remained consistent over time—approximately half of incarcerated individuals return to jail or prison within three years (Pew Center on the States, 2011, p. 13) of their release. We also know that when individuals participate in educational programs while incarcerated they are significantly less likely to reoffend. This may lead some researchers to deduce that prisons are not providing individuals with digital technology or the digital literacy education they need to successfully transition back into the community. However, we do not know anything about the digital literacy level of individuals recently released from prison to substantiate such an assumption. This research will address that gap in the existing literature. The research problem therefore is to investigate the digital literacy level of recently released incarcerated individuals.

1.3 Purpose of the research

The activities that individuals do are increasingly mediated by digital technology (Gere, 2009; Greenwood, Perrin, & Duggan, 2016; Smith & Anderson, 2016). The specific digital technologies that are used are constantly transforming to incorporate new cutting innovate features. For example, mobile phones initially supported just voice calls, and then they supported text-based messaging, and now many mobile phones support video calls. Various other digital technologies that people use have also expanded the range of use cases to support social interaction between two or more individuals across different settings (for example chatroom and second life). An individual is digitally literate if they can use these digital technologies to carry out tasks across different contexts. Current conceptual representations of digital literacy emphasis the cognitive and technological constructs of digital literacy at the expense of the increasingly important social behavioral and affective constructs, as well as a slightly more complex cognitive construct. Working with imperfect frameworks or models of digital literacy can have significant impacts. For example, overemphasizing on the technological construct can result providing individuals with training that make them very familiar with the technical functionality of digital technologies but do not see the connection and are unable to use these digital technologies to carry out different activities in their daily lives. A truly holistic framework can combat this because it can help training developers build in modules that make sure individuals learn about this.

This research will provide evidence to demonstrate that a holistic representation of digital literacy includes the aforementioned constructs. More specifically a purpose of this research is to develop and validate a holistic framework of everyday digital literacy. For purposes of this study, framework is defined as follows:

A framework usually denotes a structure, overview, outline, system or plan consisting of various descriptive categories, e.g. concepts, constructs, or variables, and the relations between them that are presumed to account for a phenomenon…they only describe empirical phenomena by fitting them into a set of categories (Nilsen, 2015).

The development of the framework will be carried out in four phases. The first phase consists of a literature review. The purpose of the literature review is to understand how digital literacy is being defined and described in the literature, how research in other disciplines can contribute to conceptions of digital literacy, and the findings from existing research. An analysis of this literature will result in a draft conceptual framework accompanied by construct indicators and construct items. In the second phase, I will validate the construct by conducting and analyzing the results of a series of card sorts based on items developed using the framework. In the third phase, I will improve the quality of a self-report questionnaire based on items developed using the framework using focus group interviews. In the fourth and final phase, I will conduct and analyze the results of a field study.

The second purpose of this research is to develop a self-report questionnaire that measures the digital literacy level of formerly incarcerated individuals. There several questionnaires that individuals in prison and recently released from prison complete, either alone or with an interviewer. These questionnaires can serve multiple purposes. They can provide prison administration and community reentry centers information including, if the individual has a mental illness, has a high school level education, and has work skills. Currently, most prisons nor community reentry centers are measuring or aggregating information on the digital literacy level of formerly incarcerated individuals in a systematic way. Having a questionnaire that can be used to prisons and reentry service providers can help in more consistent data collection and analysis. This information can help identify trends and plan interventions.

The third purpose of this research is to describe the digital literacy level of a small sample of formerly incarcerated individuals. There is research about formerly incarcerated people. This research gives us information about things like how long before individuals are rearrested, what are some of the barriers they face when they leave prison, how their relationship with the family is impacted, and how participating in education courses while incarcerated impacts if they will reoffend after release. A part from a few qualitative articles describing prison based digital literacy programs; there is no publicly available information on the digital literacy level of formerly incarcerated individuals. Having this information can help stakeholders understand issues related to formerly incarcerated individuals digital literacy levels and help them plan interventions.

1.4 Research questions & design

Very few frameworks of digital literacy that aim to be holistic exist. The frameworks' whose goal is to be holistic fall short. A purpose of this research is to develop a holistic framework. The research question that will address this gap is:

1. What is the composition of a holistic framework of everyday digital literacy?

I answer this question in two phases. In the first phase, I carry out a literature review. Two strategies are used during the literature review. I search across several databases to uncover the research that exists related to digital literacy. I search *Library and Information Science Source* (EBSCO) that contains articles primarily from U.S. based library and information-science journal. I search *Library & Information Science Abstracts* (ProQuest) which includes abstracts from 1969 until the present from over 300 periodicals published around the world. I also search Google Scholar to capture identify related articles that are published outside of the journals captured in the two databases described above. The second strategy I use involves using a backward and forward reference searching technique, also known as chain searching (Florida Atlantic University Libraries, 2017). Backwards reference searching entails analyzing the references or works cited in an article. This technique is helpful for understanding the development of theories, constructs and models over time. It also helps me identify any inconsistencies that may exist in the literature. Forward reference searching entails identifying articles that have cited after the publication of a particular article on a topic. This technique is helpful for learning about new findings and developments. The steps taken here help establish content validity (Nahm, Rao, Solis-Galvan, & Ragu-Nathan, 2002; Tojib & Sugianto, 2006).

The next phase further demonstrates content validity and establish construct validity. I carry out a series of closed card sorts. The closed card sort technique I will use is called q-sort. This technique has been used on several occasions by information science researchers. The technique helps researchers assess construct validity and improve the reliability of the constructs.

There is very little information about the digital literacy level of formerly incarcerated individuals. The information that does exist are primarily accounts about prison-based digital literacy programming. The intent of the next research question is to produce information related to the digital literacy level of a sample of formerly incarcerated individuals. It also intends to address the gap related to available information on digital literacy level of formerly incarcerated individuals:

2. What are the digital literacy levels of formerly incarcerated individuals based on measures derived from the proposed framework?

I answer this question in three phases. Before describing these phases, it is important to note that the steps taken to answer research question two also contribute to research question one. In the first phase, I create a self-report questionnaire based on the finds from research question one. In the second phase, I conduct focus group interviews with formerly incarcerated individuals and individuals who provide services to formerly incarcerated individuals. These individuals provide feedback about different facets of the self-assessment questionnaire during the focus group interviews. The focus group interviews help address design decisions that make completing the self-assessment questionnaire easier for formerly incarcerated individuals. I also meet with two researchers to explain my interpretation of the focus group data and to discuss and settle on solutions to issues identified.

The third phase further demonstrate content validity, construct validity, and establish reliability. In this phase, I field the self-report questionnaire. Formerly incarcerated individuals voluntarily take the everyday digital literacy self-report questionnaire. The results are aggregated and go through a series of quantitative tests. This helps me determine how different facets of the self-report questionnaire influence response rates and data quality.

1.5 Assumptions and limitations

This research makes assumptions related to developing the everyday digital literacy framework. One assumption is that a holistic framework of digital literacy must include a social behavioral and affection construct. Another assumption is that everyday digital literacy is significantly different from other types of digital literacy (for example school-based digital literacy and work-based digital literacy).

There are assumptions related to the development and validation of the self-report questionnaire. One assumption is that the self-report questionnaire provides the information necessary to describe and assess an individual's digital literacy level. This research also assumes that the methods that I use help demonstrate validity of the framework and the self-report questionnaire items. The use of the self-assessment questionnaire also assumes that participants reading level and attention span will not prevent them from going through the entire questionnaire and provide high quality information.

There are several assumptions related to carrying out this research with formerly incarcerated individuals. One assumption is that I will be able to locate them. In Washington State, hundreds of people are released from the 12 Washington State prisons every month. Locating them can be difficult because most people do not publicize their status as a formerly incarcerated individual, making it difficult to find after they have been released. However, I work with local service providers to mitigate this challenge. Another assumption is that individuals respond to the self-report questionnaire honestly and accurately. The research also assumes that the self-report questionnaire provides a realistic representation of formerly incarcerated individuals' everyday digital literacy level. This assumption is supported by literature that indicates that self-report questionnaire can provide realistic information on a group of interest (Hargittai, An update on survey measures of web-oriented digital literacy, 2009). Another assumption of this research is that measuring the digital literacy level of formerly incarcerated individuals will provide insights that allow us to make inferences about the digital literacy level of currently incarcerated individuals.

This research has limitations. A limitation of this research is that my sample will not include currently incarcerated individuals because I am unable to gain access to currently incarcerated individuals (Bulman, Garcia, & Hernon, 2012). Gaining access involves a time intensive process where researchers need to get approval from two unrelated—researchers' institution and department of corrections—review boards. Sometimes it involves speaking to administrative from all of the prisons a researcher wants to conduct research in and get independent letters of support prior to applying for approval. Furthermore, institutional approval does not guarantee that researchers will be able to conduct research as described in their application (Schlosser, 2008). For example, researchers describe instances where they have been informed by administration at individual institutions that they could not take in an audio recorder inside even though the research proposal had explicitly described the audio recorder as one of the research instruments. This and other challenges related to gaining access has led me to I measure the digital literacy level of formerly incarcerated individuals instead. This decision can influence my ability to generalize the results beyond the research participants.

Another limitation of this research is that individuals are being asked to self-report their digital literacy level through answering a series of questions. Completing self-report questionnaires can be difficult because they ask individuals to assess of themselves. Sometimes they are uncomfortable assessing themselves, other time they respond in ways that they think the researcher wants them to respond. Another, perhaps more accurate method to measure individuals' digital literacy level would be to ask

them to carry out a series of exercises that would measure their digital literacy level. Nonetheless, researchers have demonstrated that self-report questionnaires are a credible way to measure a phenomenon of interest (Hargittai, An update on survey measures of web-oriented digital literacy, 2009).

1.6 Importance of the study

Importance of framework

This research is important because it makes several contributions. First, this research puts forth a framework of digital literacy that aims at being holistic. Very few frameworks aim to be holistic. Most conceptualizations of digital literacy emphasize cognitive and technological constructs, often at the expense of other constructs that contribute significantly to an individuals' level of digital literacy. For example, although Eshet-Alkalai (2012) acknowledged that digital literacy consists of a complex array of social emotional activities, this never really manifested in his conceptualizations of digital literacy. Cartelli & Di Nuzzo (2010) attempted to represent the complexity digital literacy in their work, but this effort raised questions about decisions they made. There have been some more recent attempts to articulate social aspect of digital literacy. van Deursen, Helsper, and Eynon (2014) put forth a communicational Internet skills construct with eight items to measure social behaviors individuals' may engage in on the Internet (p. 13). The logic behind a given item within that construct is left to the reader to presume and the items are a bit narrow focusing primarily on self-management and peer relationship behaviors. Unlike the holistic frameworks of digital literacy that do exist, my research attempts to accomplish this by expanding the cognitive construct and developing a social behavioral and affective construct.

The framework adds to the rich collection of works in the Library and Information Sciences/Studies (LIS) field related to digital literacy. For LIS researchers this framework can expand the reach of their investigations to explicitly include behaviors not captured when using more traditional frameworks that focus on the cognitive construct of digital literacy. Using this framework extends the work of scholars like Carol Kuhlthau who were interested in the feelings people have while conducting a search on the Internet to include feeling people have about using digital technologies in general. The framework encourages LIS practitioners to actively engage learners in discussions and activities related to social behaviors, which are sometimes minimized and considered non-essential.

This research is important because it attempts to make a substantial theoretical contribution to the cross-disciplinary research that concerns itself with digital literacy. More specifically, it leans on research from the sociology and psychology in order to fill the gaps that left by research from computer and information sciences.

Importance of the questionnaire

The self-report questionnaire is another important contribution of this research. There are an array of digital literacy assessment tools available. Some as individuals to self-report, others ask individuals to complete task, while others ask participants to respond to multiple chose questions. Many exist for commercial purposes and their underlining framework is not always clear. In addition, there is rarely information available to the public regarding the validity of the questionnaire items. Virtually all of these assessment tools are interested in school-based or workplace-related digital literacy. The self-report questionnaire that is put forth in this research is on everyday digital literacy. The constructs are well-

documented and validation methods are described and replicable. This allows others who are interested in holistic measures of digital literacy to have a more solid starting point.

This self-report questionnaire is also important because it can produce information that can inform information scientists, educators, librarians, and criminal justice professionals—prison administration, prison educators, counselors, etc. The research is particularly significant for individuals working on prison educational and reentry programming related topics. Research demonstrates that correctional education plays an important role in helping people successfully reintegrate into society after they return to the community (Pryor & Thompkins, 2013). The positive long-term effects of providing incarcerated individuals with education while they are serving their sentences include a decrease in the long-term cost of housing those convicted of committing an offense and the rate at which individuals return back to prison for a new offence (Cecil, Daniella A. Drapkin, & Hickman, 2000; Fabelo, 2002; Gordon & Weldon, 2003; Hrabowski III & Robbi, 2002; Vacca, 2004; Visian & Burke, 2001).

The educational model employed in many correctional settings has not fully embraced governmental and societal efforts to ensure that all individuals use digital tools to accomplish a wide range of activities. Thus, prisons may be failing to equip incarcerated people with knowledge and skills that they need to succeed in an increasingly technological society. Although my research will not be able to say anything directly about corrections educational programs, the importance of this research lays in describing the digital literacy level of people who have been recently released. Prisons can use this information to decide which digital literacy areas they want to help incarcerated people strengthen before their release date. Prisons can use this information to develop new curriculums. Prisons can use this information to make budgetary decisions. Prison administrators can use this information to guide discussion about what technology and infrastructure investments to make in the near future.

Another reason this research is important because it provides a look into how digitally literate individuals coming from an environment that provides very little training, bans Internet use, and bans the use of most digital technologies are. This important because we live in a society that expects people to use digital technologies across different daily contexts. Being unable to do that leaves individuals with a great disadvantage. For example, technological developments over the last ten years has resulted in a greater access to and use of digital technologies to develop, maintain, and strengthen relationships—professional, platonic and intimate-- with family members, friends, and others. Being unable to use digital technologies to facilitate these activities can have impact on formerly incarcerated individuals chances of getting rearrested. Criminal justice research shows that if incarcerated individuals are able to establish and maintain family bonds that they are less likely to recidivate (Bernstein, 2003; La Vigne, Naser, Brooks, & Castro, 2005). Although this research will not directly answer questions around the use of digital technologies and family bonds, it will provide some initial insights around formerly incarcerated peoples' abilities to use the tools that serve as a catalyst to strengthening various types of person-to-person relationships.

As another example, working is another daily activity most people engage in. It is not unreasonable to assume that people rely on technology to find and maintain employment. A 2014 Pew Research report found that 94% of jobholders are Internet users and they work in technology and non-technology companies (Purcell & Rainie, 2014). According to a European Commission report focusing on 12 types of non-office jobs, the digital technologies is increasingly necessary for individuals' ability to carry out their work-related tasks. They highlight the fact that an individuals' fluency with digital technologies now

separates a skilled worker from others, for example, car mechanics with good digital skills can work with more advanced tasks while less proficient do simpler tasks (European Commission, 2017). It has been long recognized that the lack of meaningful employment is a significant reason formerly incarcerated people recidivate. It is also well established significant number of formerly incarcerated people remain unemployed because of the lack of education and skills required to meet job demands (Vacca, 2004). Although the focus of this research is not explicitly digital literacy as it relates to workplace, this research fills an important gap. It will provide insights on whether or not formerly incarcerated people have digital literacy skills that are necessary to find and keep meaningful job opportunities.

2 Literature review

The purpose of this research is to develop a holistic framework of everyday digital literacy. The goal is to use the framework to be able to measure and discuss the digital literacy level of formerly incarcerated individuals. It is important that individuals leaving prison are capable users of digital technologies because we live in a world where the use of technology continues to extend beyond professional spaces and into our personal day-to-day lives. Where it might have been suitable to limit ones use of technology for professional purposes, now use across different contexts is mandatory. People now use digital technologies across several context. Thus, they need to have the cognitive, technological, social behavioral and affective awareness, knowledge and abilities with which to make meaningful use of the digital technologies.

This work is informed by research and practitioner contributions across several domains. Research related to the criminal justice system, particularly prisons, were consulted. The prison related studies described here deal with incarceration, education in prison, the use of technology in prisons, and the transition from prison and returning to the community—reentry. This research is included to draw attention to an often ignored group of individuals that like other segments of our population are expected to use digital technologies in their everyday lives. This literature is also included as a contrast to the approach often practiced by researchers which involves using pre-kindergarten – twelfth grade (P-12) and college students to learn more about the features of digital literacy and make implied statements about the digital literacy level of individuals in the United States.

Research related to digital literacy was also consulted. The scholarly discussions on terminology used to describe digital literacy and similar concepts were highlighted to understand the similarities and differences between digital literacy and related literacies. The findings from investigators led by researchers exploring the digital literacy level of different segments of the population were reviewed to understand what trends and features of digital literacy have been identified. The existing holistic frameworks and models of digital literacy were reviewed to understand what aspects of the phenomenon have been explored and to identify any existing gaps. This literature is important because it is focused on trying to capture all of the features that contribute to an individual's digital literacy. It also provides a view into the ways different features of a digitally literate person have been described.

Some of the existing digital literacy assessment tools were reviewed to understand how others are measuring digital literacy.

2.1 The criminal justice system

The criminal justice system in America consists of several institutions that aim to maintain social control by deterring and controlling crime, and when appropriate punishing individuals who violate the law. The application of punishments for crimes vary from one state to another. Punishments can involve a fine, imprisonment, probation, and restitution. As I will discuss later in this section, African-Americans and Latinos are overwhelmingly more likely to receive prison as a punishment for a crime than their white counterparts. Discussions on the United States (U.S.) corrections justice system generally focuses on two main institutions: prisons and jails. The focus of my dissertation is prisons.

Individuals found guilty of committing an act (crime) that violates the law are sentenced to a federal or state prison. People sentenced to federal prisons typically commit an act that violates federal laws, occurs on federal property, is committed against federal institutions and federally regulated institutions, or involves the crossing of state lines. These acts include credit card and bank fraud, computer crimes, drug crimes, immigration crimes, hate crimes, international money laundering, public corruption crimes, and white-collar crimes (Federal Bureau of Investigation, 2016). These sorts of crimes are investigated by agencies like the Federal Bureau of Investigation, Internal Revenue Service, and Department of External Affairs. People sentenced to state prisons typically commit an act that violates state laws. These acts include assault and battery, domestic violence, drug trafficking, felonies, fraud, grand theft, homicide, kidnapping, robberies/burglaries, and stalking (Carson & Golinelli, Prisoners in 2012, 2014).

2.2 The prison population

The U.S. has the largest prison population in the world. Close to 2 million individuals are being held in U.S. prisons and jails. For every 100,000 people in the U.S., approximately 666 of them are in prison. For example for every 100,000 people there are 433 people in prison in Russia, 287 people in prison in Iran, and 118 people in prison in China (International Centre for Prison Studies, 2017). The U.S. represents 5 percent of the world's population, but 25 percent of the world's prison population There are close to 7 million individuals under some form of correctional supervision (e.g., serving sentences in the community) (Durose, Cooper, & Snyder, 2014).

Since the 1980's the number of people incarcerated in the U.S. has grown significantly. The U.S. prison population grew almost 350 percent between 1980 and 2004 (Frost, 2006, p. 1). The stark increase in the number of people held in U.S. prisons is largely the result of a sentencing and policy changes (Phelps, 2011, p. 33). Many punitive measures were introduced during this time (Garland D. , 2001). Among the initiatives that fueled the prison growth were the shift to determinant sentencing with sentencing guidelines and rubrics, mandatory minimum sentencing laws, truth-in-sentencing statutes that require certain people to serve fully 85 percent of their sentences, habitual offender laws, often in the form of a "three-strikes and you're out" initiatives, that require a sentence of 25 years to life upon the third felony conviction, and the abolition of discretionary parole (Frost, 2006, pp. 1-2).

The likelihood of being in prison is disproportionately skewed towards non-whites. African-American males are more likely than any racial group to be sent to prison or jail. African-American males were six times more likely than whites were and two and a half times more likely than Hispanics were to be sent to prison or jail (The Sentencing Project, 2013). A 2013 report concluded that if the current incarceration

trend continued that one in every three African American males could expect to go to prison or jail during their lifetime, compared to one in seventeen white males.

2.3 Overview of prison educational programming

Many of the close to 2 million people incarcerated in U.S. prisons (Crayton & Neusteter, 2008) are less educated than the general population because they came from situations where their access to educational opportunities was limited (Kim & Clark, 2013, p. 198; Whitney, 2009). In 1997, 80 percent of the U.S. population had a high school diploma or general equivalency diploma (GED), but only 70 percent of federal and 60 percent of state prisoners had one (Whitney, 2009, p. 787). In 2004, 36 percent of individuals held in a state prison had less that a high school education compared with the U.S. general population over 16 years of age.

The importance of education as tool to support people in prison preparing to live law abiding lives is not a novel concept. In the 1870s, the National Prison Association recognized this (American Correctional Association, 1870, p. 542). The U.S Department of Education (DOE) and the Department of Justice (DOJ) have publicly touted the importance of education (U.S. Department of Education, 2016). In 1982 the Federal Bureau of Prisons created a mandatory education law for federal facilities (McCollum, 1992). This policy requires inmates who tested unsatisfactorily or who did not receive a high school diploma or GED to participate in educational programing. This has had some positive results. A 2005 study revealed that at least 70 percent of people held in a federal prison earned their GED while in incarceration. However, state prisons do not have these requirements. A 2002 report reported that only twenty-two states required individuals in prison to participate in education programs if they have not reached a certain level of education (Koo, 2015, p. 240).

2.4 Recidivism and prison education

Recidivism is the measure most often used to determine if a prison was successful at helping incarcerated individuals prepare for life outside of prison (Travis, Western, & Redburn, 2014, p. 21). Recidivism is the rate at which individuals who leave prison are re-arrested for committing a new offense. What counts as a new offense varies from state to state. For example, in some states, being rearrested within a seven year period after your release makes you a recidivist (Kilmer, 2016, p. 26). However, in most cases, recidivism is the re-arrest, reconviction or return to prison within the first three years following release (Kim & Clark, 2013) (Recidivism 2014). In 2014, the Bureau of Justice Statistics analyzed the recidivism rate of individuals returning to communities in thirty states. They reported that approximately 68% of people recidivated within three years and 75 percent within five years. These findings underscore what past scholars have identified—the months immediately following release from prison are a critical period where individuals have the highest likelihood of violating probation or parole conditions or committing a new offense (Durose, Cooper, & Snyder, Recidivism of prisoners released in 30 states in 2005: Patterns from 2005 to 2010, 2014).

Prisons have the ability to support the rehabilitation of incarcerated individuals so that upon release, they are more likely to live law-abiding lives (Travis, Western, & Redburn, 2014, p. 200). Education can be a life-changing experience that provides incarcerated individuals with the tools to live law-abiding lives. The sort of educational programming provided at prisons extends beyond GED training, however, and it varies from location to location. Programs are designed to help individuals seek out necessary resources for employment, housing, education and vocational skills, job readiness, reunification classes on how to connect with loved ones, and substance abuse treatment (Visher, et al. 2004). Educational

programs include substance abuse programs, behavioral change programs, religious programs, and educational and vocational programs (Kim & Clark, 2013, p. 199).

Obtaining an education while incarcerated can reduce recidivism by providing individuals with the fundamental educational skills and achievements that they did not have when they entered (Koo, 2015, p. 11). Few studies on prison educational programs measure the effects of specific programs. An exception is Aos, Miller and Drake, who provided a comprehensive review on the efficacy of different adult prison educational programs. Their research revealed that basic education programs reduced the recidivism rate by 5.1%, while vocational programs reduced the rate by 12.6% (2006). Gerber and Fritsch performed a meta-analysis on all prison educational programming and found that fewer disciplinary violations occurred during incarceration accompanied by increased employment opportunities upon release (Gerber & Fritsch, 1995). They also found reductions in recidivism. The literature that exists typically reports a positive relationship between prison education programs and a reduction in recidivism (Esperian, 2010; Lichtenberger & Onyewu, 2005). For example, Wilson et al.'s meta-analysis of 33 recidivism studies revealed that participants in prison educational programs were less likely to recidivate than non-participants (2000). A 2013 meta-analysis conducted by the RAND Corporation also revealed that correctional education significantly reduces recidivism (Davis, Bozick, Steele, Saunders, & Miles, 2013). They found that people who took part in GED or high school programs were 30 percent less likely to recidivate than those who did not. Although prisons provide a range of educational programs, it is unclear how much educational programming relates to digital literacy. In addition, little to no research has been done on digital literacy levels in prisoners.

2.5 Access to and use of technology in prison

There are few studies exploring incarcerated individual's access to and use of technology. One such study is reported on in a 2012 article exploring how people in prison get access to courts to seek post-conviction relief and institutional civil rights, a federal requirement (Sabath & Payne, 2012, p. 46). They found that prisons do not provide incarcerated individuals access to computer-based technologies to conduct legal research as much as offline methods (e.g., consulting a law clerk) (Sabath & Payne, 2012, pp. 51-52). This result implies that access to digital technologies—CD ROMs and supervised access to online databases—plays a small role in the lives of incarcerated people. Sabath and Payne found that supervised internet access is more likely to be available and used at women's prisons, small prisons, non-maximum security institutions, and settings with low or very low demand for legal services. More archaic form of digital technology such as CD ROMs are more likely to be found in large prisons, maximum security prisons, and prisons with high or moderate demand for legal services. Introducing internet access to prison takes care of one level of access, but leaves others access levels unaddressed. Prison officials are not unaware of the role of digital technologies in society as a primary mode to access and use information. Sabath and Payne (Sabath & Payne, 2012) reported that several prison staff in their study stated that their facilities were increasingly relying on digital technologies to save space and reduce legal reference printed material (Sabath & Payne, 2012, p. 56). Sabath and Payne also reported that participants stressed the fact that prisons would need to increase the number of computer terminals in prisons to offer reasonable access for inmates, especially in higher security level prisons (Sabath & Payne, 2012, p. 58). Many of the prison officials who participated in the study thought access to digital technologies could be increased. They recommended the use of hard drives and in-house local area networks to support their legal collections, and anticipated having to do so in their prisons (Sabath & Payne, 2012, pp. 57-58).

In 2000, Batcheld and Rachal reported on a randomized Computer Assisted Instruction (CAI) study conducted at a prison. CAI is the use of computers as a learning tool. In the study, incarcerated men without a high school education participated in a prison education program and received one hour of GED instruction via computer every day. The control group received face-to-face instruction only. Results of the study revealed that there was no statistically significant difference in results between the experimental and control group. One implication of this is that one technique cannot be favored or deemed more effective than another (Batchelder & Rachal, 2000, p. 130). One of the findings was that the participants had trouble with the absence of an instructor when they were alone with the computer. This finding implies that it is important to accompany access to CAI with an instructor or teacher. Batchelder and Rachal conclude that after learner motivation, teacher enthusiasm is the most important feature of an effective CAI program (2000, p. 132). Batchelder and Rachal underscored the importance of considering the software applications that are being introduced into prisons, specifically, the audience the software application is geared to. The software application used in their study was designed for adolescents. They recommend using applications and experiences with a mature theme to offset the "infantilization that pervades most other aspects of prison life" (2000, p. 132).

A positive development is that educational tablets are increasingly being provided to individuals in prisons and jails. For example, Edovo (Education Over Obstacles), formerly Jail Education Solutions, a company whose mission is to provide meaningful access to education and self-improvement tools to incarcerated people, provided tablets for correctional facilities in Alabama, California and Pennsylvania, and Illinois. The tablets are made available to incarcerated individuals for about $2.00 per day, and the cost is covered by inmate welfare accounts. This educational tablet is unique in that it merges educational and therapeutic programming (Clarke, 2016). For each hour an individual spends on education, they are awarded an equal amount of time of entertainment. This attempt at using educational tablets was unexpectedly terminated at the Napa County Department of Corrections in California where prison officials claimed individuals were trying to use the educational tablets to access the Internet (Clarke, 2016).

Since the late 2000's, the availability of self-service kiosks in prisons has been increasing (O'Hagan, Hanna, & Sterritt, 2010, p. 90). Kiosks are interactive computer terminals that can serve many different functions. They can be used to download music to a portable device, view video lessons, manage the incarcerated persons' finances, send messages and images, or file a request to see a prison physician. Some prisons have begun introducing kiosks into the prisons to fulfill different functions. For example, some federal prisons in states including Arizona, Ohio, Pennsylvania and West Virginia have installed kiosk that made available by Jobview LLC (Rarick & Kahan, 2009, p. 57). The kiosk that allows incarcerated people to search a national database of jobs while incarcerated. ATM machine style kiosks are also available but they do not include a keyboard or mouse and so users are compelled to search using just a touchscreen, and no training is provided. In addition, kiosks do not have direct access to the Internet, although they are able to connect to Jobview's data center. There is no scientific research reporting on the use or efficacy of these devices.

Prisons are also using technology to enable virtual visitation (Fulcher, 2014). In the last decade, several private vendors, including JPay and Primonics Inc., have developed technologies that mediate virtual visits over web-based or closed-circuit cameras (Boudin, Stutz, & Littman, 2015, p. 180). Indiana and Wisconsin allow video visitation where incarcerated individuals are not permitted other forms of visitation. The oldest continually running virtual visitation program in the U.S. is in Pennsylvania. It was

launched in 2001 thanks to a federal grant received by the Pennsylvania DOC and the Pennsylvania Prison Society (Califa, 2006, p. 19). The program later expanded from four prisons to eight prisons in Pennsylvania, as well as one in Michigan and one in Virginia. Families can schedule a fifty-five-minute visit once a month in the Prison Society's Philadelphia office, where the Society provides family-friendly rooms. Several other prisons have followed Pennsylvania's lead. New Mexico and Oregon provide incarcerated individuals with virtual visitation. Like Pennsylvania, the Virginia DOC is collaborating with local non-profits and establishing off-site visitation centers (Califa, 2006, p. 184).

Some prisons are using technology that allows incarcerated people to send email-like messages to people in the same way that they can send letter via the post office. Federal prisons were the first to pilot and implement kiosks for this purpose (O'Hagan, Hanna, & Sterritt, 2010, p. 91). Several private vendors provide the prison with kiosks to enable this. The vendors then charge the incarcerated persons and their families for each email sent and received. Thus, it generates revenue for the vendor and the prison. Like paper mail, the prison can read the correspondences being sent. There are advantages and disadvantages to electronic messaging services. For example, it is not a replacement for paper mail. Internet access is less likely to be available in households of African-American and Latinos, populations that are overrepresented in prisons and jails (Raher, 2016).

Tablets are another type of technology that have been introduced into prisons (Bhattacharya, 2015; Moraff, 2016). Over the last few years several private vendors targeting prisons have surfaced with tablets (Railey, 2013). Current vendors include GTL (Global Tel Link, 2017), Telmate (Telmate, 2017), and JPay (Bhattacharya, 2015). About 60,000 JPay tablets have been purchased for use in 11 different states. The tablets are marketed as all-in-one devices, and they have many of the same features. They provide a suite of communication, entertainment, education, facility operations, commissary and cash management software services. The devices have no media slots, making it nearly impossible for owners of the tablets to install unauthorized software. Additionally, all of the vendors have removed or locked-down aspects of the software that may cause a security risk. One of the vendors, Telemate, markets their product as a tool that can support prison investigations. They provide prison administration with an application called Telemate Investigator that allows administration to "instantly analyze inmate's personal network and gain unprecedented crime fighting intelligence" (Telmate, 2014)

When discussing the use of technology in prison, it is also important to consider the state of Internet access. Since 2000, discussions about Internet access in prison are becoming commonplace. Arizona is the only state to ever attempt to bring widespread Internet access to incarcerated individuals (Lockard & Rankins-Robertson, 2011, p. 30). Ohio designed a statue that allows Internet use for educational purposes. Some discussion have focused on how to introduce the Internet in a conscious way (Esposito, 2000). Conversely, other discussions about Internet access in U.S. prisons focused on how to keep it out. Accessing the Internet via Wi-Fi is virtually impossible at many prisons. The layers of concrete, rebar, and wire-mesh glass are non-conducive to Wi-Fi signal (Clarke, 2016).

2.6 Digital literacy educational programming in prison

The lack of access to Internet enabled digital technologies in prison has created a situation that prevents prison educators from using Internet-based teaching methods and promoting digital literacy (Lockard & Rankins-Robertson, 2011). A few articles and anecdotal accounts describing efforts to bring digital literacy education to prisons, particularly the challenges in doing so, suggest that prisons are not currently investing in digital literacy programming. For instance, Withers et al. report on a case study on

the experiences of individuals at Orleans Parish Prison in New Orleans, who are taking part in a digital literacy prison educational program as part of their preparation to reenter the community. This education program is designed for people who are scheduled to reenter the community within nine months. Although people can self-select to participate, preference is given to individuals the prison has identified as being at medium or high risk for recidivating (Withers, et al., 2015, p. 5). Participants leave the prison to go to a non-Department of Corrections funded computer lab for access to a computers. In the computer lab, participants complete a self-paced digital literacy training program that they have one week to finish. Withers et al. (2015, p. 9) reported that participants believed that being digitally literate is important to be able to participate in today's society. The study reported that those who do not believe they are digitally literate believe that they are unprepared for life outside of the prison. The study also found that access to the computer lab and the availability of people to help participants work through challenges as they experienced them helped participants become more capable and comfortable in carrying out computer-related tasks.

2.7 Reentry – Leaving Prison

Reentry is defined in the literature as the process of leaving prison and returning to society (Visher & Travis, 2003). Although reentry is defined as a process, it is often explored as either a success or a failure (Kilmer, 2016, p. 13). Success is achieved when an individual does not get re-arrested or re-incarcerated up to seven years following release into the community. Failure is the opposite (Durose, Cooper, & Snyder, Recidivism of prisoners released in 30 states in 2005: Patterns from 2005 to 2010, 2014; Gendreau, Little, & Goggin, 1996). Over 95 percent of individuals incarcerated will eventually return to their communities. According to the Office of Justice Programs, approximately 10,000 reentering individuals return to the community every week, which is over 600,000 a year (Travis, Western, & Redburn, 2014, p. 195).

Challenges associated with leaving U.S. prisons and reentering the community have been explored for several decades. People leave prison and step in to a world that is not designed to support their successful transition back into the community (Nahan, Bowen, & Polzer, 2017, p. 1). Some of the most substantial challenges for individuals reentering the community from prison include obtaining employment, obtaining housing, reconnecting with family members, finding and using transportation and obtaining healthcare (Rarick & Kahan, 2009, p. 57; Travis, Western, & Redburn, 2014). For example, numerous research studies have found that approximately half of the people who reenter the community from prison were unable to obtain employment up to a year after their return (Travis, Western, & Redburn, 2014, p. 234). Holzer et al. reported that after their status as previously incarcerated individuals, the lack of work experience and the lack of a high school diploma were the most significant barriers in finding employment. A longitudinal study of 740 males leaving prisons in Illinois, Ohio, and Texas found that only 45 percent were formally employed eight months after returning (Visher, Debus-Sherrill, & Yahner, 2011). A 2007 study based on an analysis of unemployment insurance data found that approximately 43 percent of individuals released between 1999 and 2000 from Ohio prisons were unemployed one year after returning to the community (Sabol, 2007). Other studies have reported lower rates of employment than the ones discussed above (Festen & Fischer, 2002; Petersilia, 2003; Visher, 2006).

In the 21st century, access to employment opportunities requires an individual to be digitally literate. Being digitally literate is necessary to find a job and in some cases necessary to successfully perform and

retain a job. Gee (2000, p. 413), Jenkins et al. (2009) and others suggest that using digital technologies enables individuals to acquire the skills and disposition needed to find and keep jobs. Access to education can lessen barriers to finding employment. In 2013 the RAND Corp. reported that individuals who participated in prison education were 13 percent more likely than nonparticipants to secure employment in the months after returning to the community. Some attribute the lower recidivism rates of participants to the fact that those individuals become focused on prosocial activities, which puts them in a social context that encourages conformity (Duran, Plotkin, Potter, & Rosen, 2013; Lipsey, 1995).

Although the importance of prison-based education is well recognized, there is very little information available about the efficacy of reentry programming (MacKenzie D. L., 2008). Studies that do exist are sometimes inadequate and sometimes present mixed results (Listwan, Cullen, & Latessa, 2006; Petersilia, 2004). For example, some studies overlook important features of these programs including time spent in the classroom, exact program elements, and the level of academic achievement attained (Travis, Western, & Redburn, 2014, p. 197). These programs vary in intensity, duration, and curriculum, and not all studies take this into consideration.

2.8 U.S. prisons, digital technologies, and digital literacy

In the United States, incarceration and the reentry of incarcerated persons into their communities is a problem. There are over two million people in prison. African-Americans and Hispanics are significantly more likely to be incarcerated than whites for similar crimes. Over 95 percent of the people incarcerated will return back to the community. The hundreds of thousands of men and women who reenter their community every year face many barriers and challenges. These challenges touch all aspects of their lives and include things such as reconnecting with family, locating employment, taking advantage of educational resources, and living crime free lives. In contemporary society, all of these aspects of people's lives are affected by digital technologies. Individuals leaving prison need to know how to integrate digital technologies in to their everyday lives.

However, as discussed above, incarcerated individuals rarely have access to the open Internet. Access to computers is typically limited to individuals enrolled in a prison education course and individuals interested in doing legal research. Few companies have contracted with prisons to provide incarcerated individuals with selective access to digital technologies. Very few of the reentry orientated educational programs provide anything that resemble digital literacy training. Furthermore, there is no substantive research on the nature of these programs or their efficacy. Thus, we have no information about the extent to which formerly incarcerated people become digitally literate as a result of participating in these rarely offered programs.

2.9 Digital Literacy

To understand digital literacy, I first explored literacy studies research, attempting to discover if, and in what manner, the literature on literacy could provide guidance in researching digital literacy. The work of social historian Harvey Graff, particularly his book length study, *The Labyrinth of Literacy*, characterizes and critiques this research in a way that helps to frame a study of digital literacy (1995). Graff argues that literacy is "profoundly misunderstood." (Graff, 1995, p. 5). He traces the continued misunderstanding and the misperceptions of literacy to the tendencies of researchers to: (a) formulate inconsistent and unrealistic definitions of literacy (b) not appreciate the conceptual complications presented by the subject of literacy, and (c) ignore the vital role of socio-historical context.

Expanding the traditional literature and research on literacy, Heath (1987; 1988), Street (1988; 1995), Langer (1987; 1992), and others introduce a more critical perspective to discussions of literacy. Collectively they represent a field of study that Street (1995) called New Literacy Studies. Street, influenced by the work of Graff, and one of the main proponents of this movement, defines literacy as "a social practice, not simply a technical and neutral skill; … it is always embedded in socially constructed epistemological principles" (Street, 2003, p. 77). Street's definition is in opposition to the *autonomous model* of literacy, which defines literacy in a way that detaches it from social contexts. Street is saying that literacy can only be understood by looking at a specific context and how people in those contexts act and how they conceptualize knowledge, identity and being. The framework of digital literacy proposed in my dissertation demonstrates a conscious effort to incorporate Street's view of technology as a tool used for decoding and producing material.

Digital literacy terminology

Digital technologies have altered what it means to be literate. Over the last few decades, in parallel with the increased ubiquity of Internet connected digital devices in society, many definitions of digital literacy have emerged in the literature (Bawden, 2008, p. 25; Brandtweiner, Donat, & Kerschbaum, 2010; Martin, 2008; Stiller & LeBlanc, 2006). The more traditional definitions tend to emphasize the cognitive and technological aspects of the phenomenon, referencing key terms such as comprehension, skill, and ability (Bawden, 2001; Eshet, 2002; Lankshear & Knobel, 2006; Leahy & Dolan, 2010).The definitions provided in Table 2-1 are selected to highlight major differences among the many definitions of digital literacy and to demonstrate the increasing complexity of those definitions. For example, one of the earliest definitions focuses only on cognitive activities like finding, evaluating, and understanding (Gilster, 1997). Another early definition focused on learning and interacting with the technology (Selfe, 1999). Definitions from about the mid-2000's on highlight creative thinking activities like evaluating and creating. Many of the definitions do not explicitly include the social behavioral aspects of digital literacy. For example, Leeds Metropolitan University's definition listed in Figure 2.1.

Figure 2.1: Sample set of traditional digital literacy definitions

> …ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers (Gilster, 1997, pg. 1)
>
> ...the ability to learn, comprehend, and interact with technology in a meaningful way (Selfe, 1999)
>
> … ability to perform tasks effectively in a digital environment... Literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments (Jones-Kavalier and Flannigan, 2008, pg. 13)
>
> .. the confident and critical use of information and digital technologies to enhance academic, personal, and professional development (Leeds Metropolitan University, 2011).
>
> ...the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (ALA Digital Literacy Taskforce, 2011).

Many researchers and practitioners have used varying "literacy" terms interchangeably with digital literacy, but this creates the exact same type of problem Graff identified with respect to the term "literacy" in that they do not all mean the same thing. For example, the term "computer literacy," defined as the ability to use different software packages effectively, is sometimes mistakenly used

interchangeably with digital literacy by practitioners (Bawden, 2008). “E-literacy” coming from “electronic literacy” was introduced as a word to be used interchangeably with digital literacy (Kope, 2006). However, the term struggled to get traction because it was often mistakenly equated to the term “illiteracy” (Bawden, 2008, p. 25).

Between 2012 and 2015 nearly 700 articles and books were published that related to literacy and digital technologies. Among them, 35 different literacy terms were mentioned including established literacies like computer literacy to recently proposed literacies like metaliteracy (Stordy, 2015, p. 457). The proposal of new literacy types that account for multiple digital technologies can be attributed to the changing digital landscape. This landscape has seen social media and collaborative communities surface, online chat sites gain popularity, and static websites become interactive, allowing collaboration and accompanied by sound and video (Stordy, 2015). These developments have led researchers and practitioners to propose new literacies such as ‘internet literacy’ (Livingstone, 2008), ‘cyber-literacy’ (Gurak, 2003) and ‘media and information literacy’ (UNESCO, 2017). We have also seen new terms such as transliteracy (Thomas, et al., 2007), multimodal literacy (Jewitt & Kress, 2003), information literacy 2.0 (Tuominen, 2007) and metaliteracy (Mackey & Jacobson, 2014).

Of all of the different literacy terms that have been used over the years, the term “information literacy” is the one that most resembles digital literacy in meaning. However, they are different. Information literacy’s central focus is the cognitive tasks individuals must carry out when they are engaged in information seeking and use, whereas digital literacy’s focus is on the use of digital technologies focusing on cognitive *and* social skills.

In the early discussions of information literacy, the American Library Association put forth a six-stage model of information literacy, which has had great influence. It presented information literacy as six linear steps:

- Recognizing a need for information
- Identifying what information is needed
- Finding the information
- Evaluating the information
- Organizing the information
- Using the information

These steps are the foundation for virtually all approaches to information literacy. Researchers who extend or refine these steps do so by adding elements. For example, they divide “finding information” into choosing resources, searching and accessing the items identified, or adding facets like communicating information, or storing / archiving / deleting information. Behren (1994) notes that some information literacy professionals do not see information literacy as an add-on to traditional conceptions of literacy, but rather a factor that changes how traditional notions of literacy should be viewed (Bawden, 2001, p. 237). Examples of this view are excerpted from Bawden’s article “Information and Digital Literacies; A Review of Concepts” (2001, p. 237):

> We will have to acquire a new bundle of information skills, which will be fundamental to functioning in society ... we will have to expand the traditional skills of literacy ... we are proposing that true literacy, in an era when information is a strategic global commodity, has to

include information literacy. In short, information literacy is a necessary expansion of the traditional notion of literacy (Olsen and Coons)

What does it mean to be literate in an information society? Information literacy is closely tied to functional literacy. It involves the ability to read and use information essential for everyday life (Kuhlthau)

The word 'literacy', meaning the ability to read and write, has gradually extended its grasp in the digital age until it has come to mean the ability to understand information, however presented (Lanham)

Information literacy ... goes far beyond the traditional textual literacy that has been consider part of a basic education (Lynch)

Not surprisingly, the researchers quoted above specialize in the area of information literacy. One of the weaknesses of this research is important to note, which is that none of these scholars do literacy research. Furthermore, despite their lack of scholarly expertise in literacy studies, all make assumptions about literacy itself, describing it as traditional, functional, textual, and the ability to read and write. Another common weakness is the absence of any definition of the term "information;" or, at the very least, an explanation of the way in which the use of the term "information" relates to the parent concept of literacy.

None of the definitions of the various literacies related to digital literacy discussed above, including those of information literacy, are inclusive enough and broad enough to provide a basis for studying the phenomenon I would like to study. The definition that possesses most of the elements that appear across the various literacies definitions is that of Martin (2008). Based on an extensive literature review, Martin posits that digital literacy:

- entails being able to complete tasks in digital environments that support everyday life
- varies from one situation to another and is continuously transforming to meet an individuals' life situation
- entails using knowledge and techniques, and acquiring attitudes and personal qualities that will allow an individual to plan and do things with digital technologies to support activities in their everyday life
- entails being aware of and actively thinking about how to strengthen your own digital literacy level across contexts.

(Martin, Digital literacy and the 'digital society', 2008, p. 166):

Martin's definition, which is based on the key elements described above, is:

"the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process" (Martin, Digital literacy and the 'digital society', 2008, pp. 166-167).

This definition demonstrates the complexity of digital literacy, and is very close to a definition that I believe expresses the full meaning of the term. This definition is also important because it actively acknowledges that context is critical by incorporating "…the context of specific life situations..." As

noted above, being digitally literate in one context does not equate to being digitally literate across several contexts – for example, being digitally literate in everyday life is not necessarily the same as being digitally literate in a school setting.

One key concept absent from Martin's definition is *knowledge*. It is important to include the knowledge in the definition because knowledge influences everything that follows (e.g., abilities) in ways that none of the other concepts do. For example, I may be aware that social media tools exist. However, this awareness does not imply that I have the knowledge required to use them. As a result, for the purposes of this research, I use a slightly modified Martin's definition of digital literacy, which includes the concept of knowledge and points to "awareness, knowledge, attitude and ability" as a pre-requisite:

the awareness, *knowledge*, attitude and ability of individuals *required* to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process

Inserting the term "knowledge" into my definition will increase the likelihood that I can capture a comprehensive picture of people's digital literacy levels in the research. Inserting the term "required" into my definition posits that to be considered digitally literate to any extent an individual must possess evidence of each of these features, even if the evidence is minimal.

Digital literacy research

There are different streams of digital literacy research. There is research that focuses on school-based digital literacy that is often divided into research that either looks at P-12 students or college students. There is another stream of research that investigates digital literacy as it relates to educators. A third stream of research looks at the acquisition of digital literacy outside of the school environment.

Most studies of digital literacy relate to P-12 students. Livingstone found that children's digital literacy levels were not advanced because the stakeholders—anxious parents, uncertain teachers, busy politicians, profit-oriented content providers—managing their access to Internet-enabled digital technologies were unsupportive (Livingstone, 2008, p. 110). A study by Ng (2012) found that K-12 students rated themselves as having varying levels of awareness and proficiency with digital different digital technologies. For example, he found that although students were familiar with and used YouTube and Facebook, few had used technologies such as wikis, blogs, Google Docs, and Smartboards (Ng, 2012, p. 1072). The study also found that over 75% of students in the study were not proficient in creating webpages, and 53% were not proficient with photo editing applications. Significantly, some studies have found that increased use of digital technologies did not result in increased digital literacy levels (Hargittai, 2010; Hargittai & Hinnant, 2008; Kennedy, Judd, Churchward, Gray, & Krause, 2008).

Another line of research focuses on teachers. This research concerns teachers' digital literacy as it relates to integrating technology into teaching practices. For example, Hicks and Turner (2013) outline teaching practices that would inhibit a students' journey towards becoming digitally literate. Among the list of teaching practices inhibiting digital literacy were counting slides, criticizing ways of speaking practiced online, and asking non-critical questions that can be answered by simply copying and pasting content from the web. Pianfetti's (2001) research concluded that in order for teachers to successfully implement and integrate technology in the K-12 classroom they themselves must be digitally literate.

Pianfetti identified the following factors as important to helping teachers become digitally literate: administrative support, time for teachers to learn new skills and to explore the ways in which those technology skills can be integrated in their curriculum, and access to up-to-date resources (Pianfetti, 2001). Pianfetti also noted that professional development is not enough and that teachers must understand and look for ways that technology may enhance instruction and student learning. Kennedy et al. (2008) recommended that teachers structure their curriculums to include digital literacy instruction (Kennedy, Judd, Churchward, Gray, & Krause, 2008).

Meyers et al. (2013) discuss the role informal learning environments play in helping children cultivate digital literacy. They highlight the work of multiple scholars, including Jayne Lammers (Lammers, 2013), who illustrates how participants from a casual writers' forum learn how to write socially and negotiate relationships. danah boyd's seminal work reveals what young people do online and argues that young people today are similar to those in the past in the sense that they are at an age where they are trying to define their social identities (2014). She points out that what is different is that nowadays children have a greater variety of ways to express themselves. For example, children decorating their social media pages to reflect themselves is akin to children decorating their bedrooms in the pre-online social media era. Both are personal forms of expression, one online the other offline. Gardner and Davis (2013)argue that young people are increasingly dependent on digital media and apps as short-cut solutions to help them carry out discrete tasks or fulfill their needs.

Hargittai and Hinnant's (2008) research found that individuals with higher levels of education reported having a greater number of digital skills and being more likely to visit websites that may benefit their financial capital (2008). They also found that college-aged students from more privileged backgrounds reported a greater understanding of technology than those with less privileged backgrounds. They also were more likely to say that they used Internet-enable digital devices for a wider range of activities (Hargittai, 2010).

Other research looks at digital literacy in the context of the workplace. For example, Mohammadyari and Singh's (2015) study of New Zealand workers found that few individuals were using online resources for professional development purposes. They also found that individuals with higher levels of digital literacy were more likely to use online resources for professional development.

Hargittai studied methodologies used in digital literacy research (2003; 2009). She compared the results of research using self-report measures of digital literacy with research using observed measures of digital literacy captured through having people complete a task. The self-report digital literacy research was part of the 2002 and 2003 General Social Survey, a large-scale annual sociological survey used to collect information on the concerns, experiences, attitudes, and practices of residents of the United States (NORC, 2016). Hargittai found that contrary to what others have reported, self-report measures of digital literacy can be as effective as observed measures, which can be expensive and time intensive (Hargittai, 2003).

Major digital literacy frameworks

Frameworks, or models, provide a rationale for conducting research and investigating a particular phenomenon. Where applicable, frameworks summarize theories related to a particular problem. The purpose of a framework is to show that what one is suggesting is not based solely on personal intuition, personal instincts or guesses, but instead is formed using findings from previous research. Furthermore,

a framework gives you a particular way of interpreting a phenomenon (Miles & Huberman, 1994, p. 18). Although the concept of digital literacy has been around for a few decades, very few frameworks of digital literacy exist (Buckingham, 2010; Martin, 2005). There have been very few attempts to develop a holistic framework to describe and understand it. Below I present four of the frameworks I encountered during my literature review. I selected these because their authors aimed to make them holistic representations of digital literacy, considering constructs of digital literacy outside of simply cognitive or technological constructs. Furthermore, these frameworks of digital literacy are the ones that most inform the framework developed in this dissertation.

Eshet-Alkalai's model of digital literacy

Eshet-Alkalai (2002) developed a skills-based model of digital literacy comprised of four skill sets: (1) photo-visual (2) reproduction (3) branching, and (4) information (table 2-2). All four skill sets described cognitive activities. This initial digital literacy model was comprised of a single construct, i.e., cognitive. The model was proposed to shed light on cognitive skills users engage when undertaking actions in digital environments. It was also intended to provide educators and software developers with guidelines for designing digital environments that centered around users' interactions with digital technologies.

Table 2.1: Eshet-Alkalai's (2002) Initial Model of Digital Literacy

Skill set	Definition
Photo visual	Ability to understand and interpret information displayed using graphical interfaces.
Reproduction	Ability to utilize digital reproduction technologies to create new, meaningful materials from pre-existing ones.
Branching	Ability to process non-linear, hyper-textual navigation to construct knowledge and comprehend meaning.
Information	Ability to critically evaluate the quality and validity of information. Ability to think abstractly.

As Eshet-Alkalai (2002) developed his initial model, other researchers were developing socio-psychological profiles of users of digital environments (e.g., Amichai-Hamburger, (2002); Hamburger & Ben-Artzi, (2000); Mundrof & Laird, (2002). Based on these findings and the increasing range of activities the Internet provided, Eshet (2004) revised his initial model to include a new skill set called socio-emotional literacy. See Table 2.2. Eshet-Alkalai's socio-emotional construct drew attention to the fact that people were actively engaging with other individuals and so there were new issues to think about, for example:

… how is it possible to know whether individuals in a chat room are really who they say they are? How can we tell whether a call for blood donations on the net is real or a hoax? Should we open an electronic mail from an unknown person, even if the mail's subject seems to be interesting? It might contain a virus, but then again, it could be genuine (2004, p. 102).

Table 2.2: Construct Added to Eshet-Alkalai 2004 Model of Digital Literacy

Skill set	Definition
Socio-emotional literacy	Ability to manage the sociological and emotional aspects of work in cyberspace

Eshet-Alkalai (2004) goes on to say that socio-emotionally literate users are individuals who

… are willing to share data and knowledge with others, capable of information evaluation and abstract thinking, and able to collaboratively construct knowledge … (p. 102)

This description of socio-emotionally literate users of digital technologies is very similar to definitions and descriptions provided in cognitive constructs defined by other researchers. In addition, it does not highlight sociological (e.g. (be)friending someone) or emotional (e.g. posting an empathic response on a blog post) features of interaction with other individuals using digital technologies.

In 2012 Eshet revised the cognitive construct of his 2002 model to include a new construct called "real time thinking." See Table 2.3. Eshet-Alkalai's real-time thinking is centered on an individual's ability to concurrently process an array of stimuli that appears in real-time at high speed (2012, p. 268).

Table 2.3: Real-time thinking construct added to Eshet-Alkalai 2012 model of digital literacy

Skill set	Definition
Real-time thinking	Ability to process large volumes of stimuli at the same time, as in video games or in online teaching

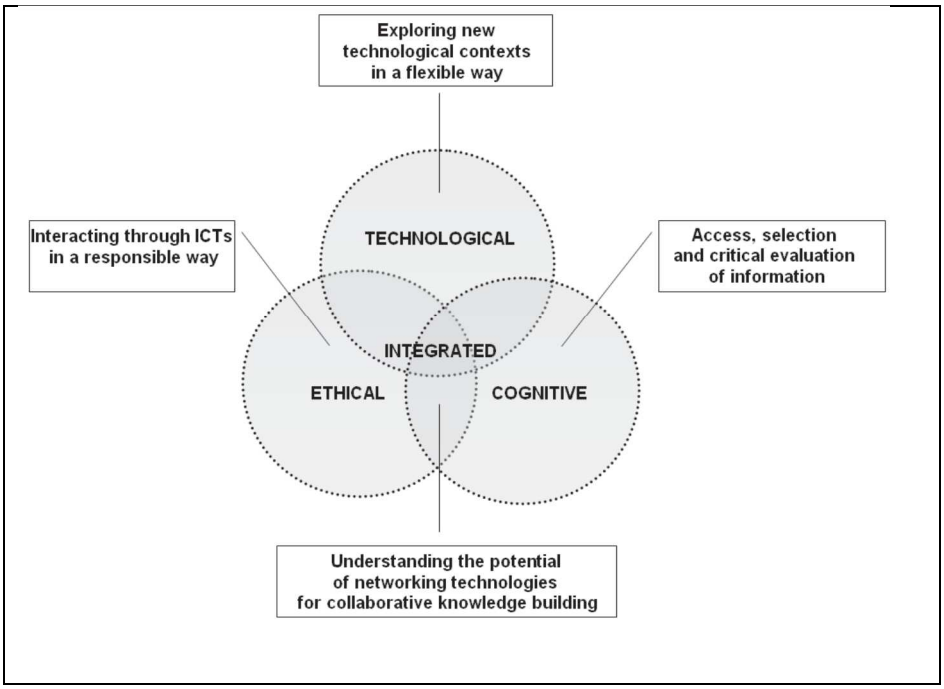
Eshet-Alkalai posits that an individual with real-time thinking skills is able to spit their attention in order to react to different things going on concurrently in different places of a monitor, perform multiple tasks at once, respond to real-time feedback provided by digital technologies, and to quickly make sense of everything (2012, p. 271).

Eshet-Alkalai's model of digital literacy has several strengths. First, it confirms the importance of presenting the cognitive and technological constructs independent of each other. Second, Eshet-Alkalai's socio-emotional construct draws attention to the importance of considering the social dynamics of the Internet. Finally, it also draws attention to the idea that emotions are an important aspect of being digitally literate. As weakness of this model is its exclusive focus on the cognitive construct.

Calvani's Model of digital literacy

In 2008, Calvani et al. introduced a model of digital literacy, see Figure 2.2, meant to counter contemporary models and digital literacy exams, in particular, the European Computer Driving License, which focused on specific technical skills. When developing their framework, Calvani et al. recognized the lack of frameworks and measures of digital literacy that focused on everyday life (Calvani, Cartelli, Fini, & Ranieri, 2008; Fini, 2007)). Their intent was to develop a model that highlighted the importance of digital literacy for a critical understanding of technologies, the importance of a cognitive and cultural background, the ability to select and manage information, and the importance of relational and ethical awareness (Calvani, Cartelli, Fini, & Ranieri, 2008, p. 184).

Figure 2.2: Calvani's model of digital literacy



Calvani et al.'s model of digital literacy is comprised of three constructs (1) technological, (2) cognitive, and (3) ethical. Calvani et al. designed their framework with the intention of developing a set of assessment tools that would measure the digital literacy level of pre-high school aged youth—15 to 16 years old. When analyzing the constructs that make up their model (see table 2-5), I noticed that although the technological and cognitive are consistent with what other authors have proposed. The ethical construct was different because it was the first to define interaction between people as an explicit construct within a digital literacy model. Another difference is that the ethical construct asserts that in order to be digitally literate an individual must exercise moral behaviors.

Table 2.4: Calvani et al.'s (2008) digital literacy constructs

Construct	Definition	Indicators
Cognitive	Being able to read, select, interpret and evaluate data and information taking into account their pertinence and reliability	• Activities requiring individuals to engage with text and other information sources. • Summarizing, representing, analyzing texts • Organizing data • Selecting and interpreting texts • Selecting and evaluating relevant information • Evaluating reliability of information

Construct	Definition	Indicators
Technology	Being able to explore and face problems and new technological contexts in a flexible way	• Ability to use information and communications technologies in a variety of context • Recognizing environments and interfaces. • Recognizing possible solutions for technological troubles • Selecting the most suitable technical solutions to problems • Dealing with logical operators and operations. • Charting out processes • Recognizing the difference between real and virtual
Ethical	Being able to interact with other individuals constructively and with sense of responsibility using available technologies	• Safeguarding oneself • Respecting others on the net • Understanding social and technological inequalities
Integration between the three dimensions	Understanding the potential offered by technologies, which enable individuals to share information and collaboratively build new knowledge.	

Calvani et al.'s model of digital literacy has several strengths. Similar to Eshet-Alkalai, it confirms the importance of presenting the cognitive and technological constructs independent of each other. Second, Calvani et al.'s ethical dimension draws attention to the importance of the social dynamics of the Internet. Finally, like Eshet-Alkalai (2004), the model recognizes the complexity of the emotions and social relationships that were introduced by Internet connected digital devices, which is captured in the proposed framework. A weakness of the framework is that it is missing a construct that considers of social behaviors more broadly. Also, the ethical label assigned to the construct is misleading. An analysis of the definition and indicators used in the ethical construct shows that they are interested is "the principles of conduct governing an individual or a group" (Merriam-Webster Incorporated, 2017). Although this can be defined as ethics, it is not the same as more traditional conceptions of ethics as a set of moral principles. A more common and less ambiguous phase that they could have used would be pro-social skills. Two of the three indicators they provide, "safeguarding oneself" and "respecting others on the net" further emphasize this point.

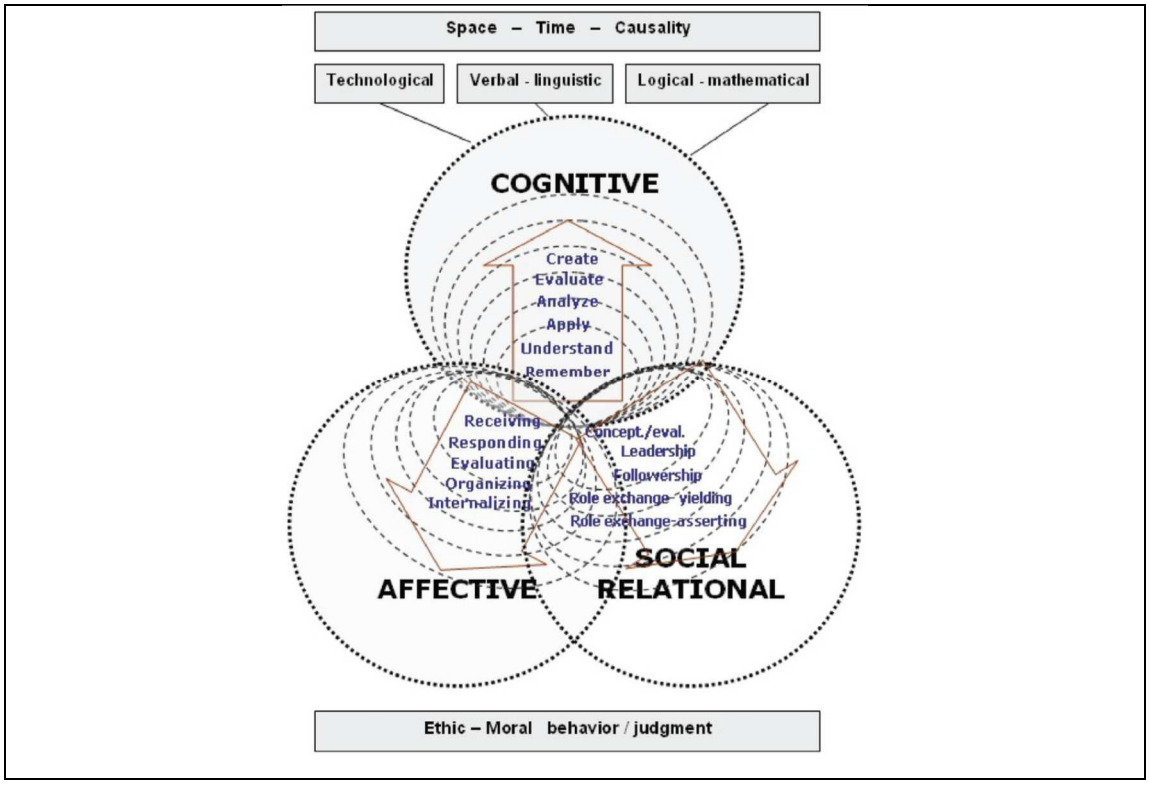
Cartelli and Di Nuzzo's model of digital literacy

Cartelli and Di Nuzzo's (2013) model of digital literacy is comprised of three constructs: (1) cognitive (2) affective, and (3) social-relational. I present only the most mature version of the model. See Figure 2.3.

For simplicity, I will discuss all of Cartelli's prior work with his colleagues as Cartelli and Di Nuzzo. Readers interested in the iterations that led up to the model presented here and the origins of the model should review the following articles: (Cartelli, 2012; Cartelli, Dagiene, & Futschek, 2010; Cartelli & Di Nuzzo, 2013). Cartelli and Di Nuzzo's model was developed with intentions of creating a set of assessment tools that would measure the digital literacy level of pre-high school aged youth, 15 to 16 years old, and addressing the shortcomings in the model of digital literacy proposed by Calvani et al. (2008).

When analyzing the constructs that make up their model, see Figure 2.3, I noticed a few things. First, unlike any of the other models of digital literacy, Cartelli and Di Nuzzo's model embeds the technological construct within the cognitive construct. Next, Cartelli and Di Nuzzo's model introduces an affective construct. The affective construct asserts that the stage an individual is at in developing an affective disposition towards digital technologies—from a general awareness to the point where the affect is 'internalized'—impacts their digital literacy level. In addition, Cartelli and Di Nuzzo introduce a social relational construct. This construct asserts that an individual's social interactions, particularly those that are hierarchal, influence an individuals' digital literacy level. Hierarchical social interactions are interactions between individuals with varying levels of power and status—formal or informal, for example student/teacher, manager/worker, apprentice/apprentee, high school student/junior high school student (Magee & Galinsky, 2008). In addition to the three constructs described above Cartelli and Di Nuzzo also include a meta-construct: ethic-moral behavior / judgement. Cartelli and Di Nuzzo believe that the meta-construct traverses and influences the cognitive, affective and social-relational constructs because interactions with digital technology can alter the perception of ethical behaviors in digital environments (2013, p. 56).

Figure 2.3: Cartelli et al.'s model of digital literacy



Cartelli and Di Nuzzo's model of digital literacy has strengths. One strength is that they attempt to label and define constructs, the social relational construct and the ethical sub-construct, that capture the social interactions a digitally literate person would engage in. Another strength is that it includes an affective construct highlighting the importance of considering an individual's feelings when assessing their own digital literacy levels. Cartelli and Di Nuzzo's model does, however, have weaknesses. Cartelli and Di Nuzzo do not provide much information about why they incorporated their affective taxonomy, which only describes emotional staging; in other words, it only describes where an individual is in developing an emotion about a digital technology and not tell use the sort of emotions people have about digital technologies and performing tasks with digital technologies. Another weakness is that Cartelli and Di Nuzzo's model is that their social relational construct does not adequately describe behaviors that extend beyond role-playing in online social interactions. It is constrained to social interactions one has established only through socially established hierarchal structuring of power relations (2013, p. 58). Finally, Cartelli and Di Nuzzo's model collapses the technological construct and the cognitive construct into a single construct. The cognitive construct and technological construct are clearly different enough to warrant two individual constructs, which is supported by the number of other researchers in this area who recognize them as separate. Finally, Cartelli and Di Nuzzo never fully describe the connection between the model's three constructs (cognitive, social-relational and affective) and the meta-construct: ethical - moral behavior / judgment.

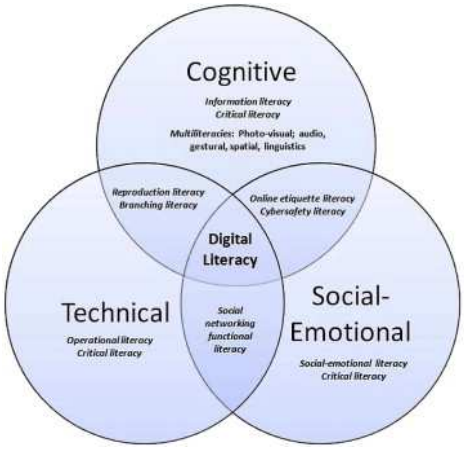
Ng's framework of digital literacy

In 2012, Ng introduced a framework of digital literacy meant to bring together the broad definitions and the specific facets of different literacies related to digital technologies (p. 38). Ng's framework of digital literacy, see Figure 2.4, is targeted towards educators who teach science. His framework borrows from the work of several scholars, including Eshet (2004). Ng's framework is concerned primarily with scientific learning via desktop/laptop and mobile devices and it consists of three constructs: cognitive, technical and social-emotional. See Figure 2.4.

Ng defines the cognitive construct of digital literacy as:

"…the ability to seek out information and critically analyse and use them to achieve a purpose [, information literacy] and… the ability to decode meanings from textual, visual, audio, spatial and gestural forms of representations [multiliteracies]" (2012, p. 53)

Figure 2.4: Ng's constructs of digital literacy



His discussion of the cognitive construct (see table 2.7) is similar to those of other scholars (Eshet-Akalai, 2004; Ng, 2006, Ng and Gunston, 2003). Specifically, there is a strong focus on individuals being able to evaluate and select appropriate programs to learn with, and being able to search, assess, and use web-based information and resources (Ng, 2012, p. 46; Martin & Grudziecki, 2006).

Ng defines the technical construct of digital literacy as:

> "…operational abilities to use technology in a functional manner so that learning could take place" (p. 53-4)

Ng's discussion of the technical construct (see table 2.7) includes topics like an individual being able to assemble different components (for example, insert the cord of a mouse into a USB port) of a given digital technology in order to use that technology, and being able to use particular software applications to carry out specific tasks.

Ng defines the social-emotional construct of digital literacy as:

> "…the awareness of one's own self in digitally enhanced environment, particularly in online communities where the individual needs to self-manage his/her emotions and impulses, motivation and perseverance, and to be reflective in how (s)he relates to others online socially or in collaborative team work" (p. 54)

With the increased presence of Internet-enabled digital technologies in our lives, individuals spend significant amounts of their time online chatting, exchanging ideas and collaborating (Ng, 2012, p. 52). The social-emotional construct (see table 2.7) was put forth to draw people's attention to the social and safety (cybersafety—safety online) aspects. Ng centers the discussion of the social-emotional construct on cybersafety.

Table 2.5: Ng's digital literacy construct

Construct	Skills and abilities
Cognitive	Use the Internet effectively for information gathering and synthesis Be multiliterate
Technical	Able to connect and use input and peripheral devices Knowledge of working parts Able to troubleshoot Able to operate adequately
Social-emotional	Use the Internet responsibly for communicating, socializing, and learning

Ng's discussion of his model stands out from the discussion of other scholars because he recognizes what lies at the intersection of the constructs. For example, Ng (2012, p. 43) posits that the cognitive and technical skills involved in using the software packages come into view when individuals learn to use a particular software application, e.g., Microsoft Excel's VLOOKUP feature. Ng points out that the intersection of the cognitive and social-emotional constructs can involve being able to identify and deal with online threats and risks, e.g., "being bullied, stalked, harassed and exposed to identity fraud and inappropriate materials…, illegal materials, spam and computer viruses" (p.53). Finally, the intersection

of social-emotional and technical dimensions of digital literacy can involve being able to use digital technologies to find your way around and engage in the complex social spaces that exist online. These spaces include blogs, gaming, and video sharing websites (p. 54).

Ng also identifies literacy sub-constructs under each of the main constructs of digital literacy. One of the supporting sub-constructs for the cognitive construct is information literacy. Ng's discussion of the information literacy sub-construct is influenced by and aligns with what past researchers have proposed (for example Eshet-Alkalai, 2012). Another sub-construct that Ng introduces and discusses at length is critical literacy. Ng embeds critical literacy at the center of each of the three constructs. Borrowing from Tasmanian Department of Education (2009), Ng defines critical literacy as "the ability to analyse and critique the relationships between texts, language, power, social groups and social practices" (p. 55).

Ng's discussion of critical literacy resembles discussions and research on information literacy led by earlier scholars and practitioners. Ng argues that digitally literate individuals must scrutinize information, including conversations and opinions, found online about scientific topics including global warming, genetically modified food and nanotechnology.

The framework (see Figure 2.4) and constructs (see Table 2.5) presented by Ng have several strengths. First, Ng's framework synthesizes and builds upon the contribution of his predecessors. It also exemplifies the complexities associated with digital literacy, particularly how an activity like learning about Excel from YouTube videos can incorporate the cognitive, technical and socio-emotional constructs simultaneously. Next, Ng's framework of digital literacy calls the reader's attention to social dimensions of digital literacy that are often skimmed over by other frameworks. Ng's framework as weaknesses, however. One weakness of Ng's framework is that it presents the social behavioral and affective constructs as a single construct. Doing so may lead emotions to be conflated with behaviors. Separating the two allows researchers to better understand the extent to which behaviors influence emotions and vice versa. Another weakness is that Ng's view of the social-emotional construct puts a very strong emphasis on behaviors around cybersafety at the expense of other social behaviors. It says significantly less about other prosocial behaviors and emotions such as interpreting the tone of messages (for example using capital letter or emoticons) received through social media channels. Finally, Ng's work is focused specifically on P-12 school-based digital literacy.

Existing digital literacy assessment instruments

One of the goals of social science is to offer theoretical explanations of phenomena such as digital literacy (Jarvis, MacKenzie, & Podsakoff, 2003, p. 199). Frameworks and models are formal expressions of those theoretical explanations. Ideally, frameworks and models are tested/evaluated by designing measurement or assessment instruments to determine their efficacy in explaining a phenomenon. This process of measurement typically involves: (1) conceptually tying a construct to indicators, (2) using these indicators to gather information about the phenomenon of interest, (3) aggregating and mathematically analyzing the information gathered, and (4) using the analyzed information to understand how well the phenomenon and the supporting constructs are being represented (Zwanenburg, 2015, p. 2). The process of measurement helps researchers understand the degree of correlation between the constructs and their measures—construct validity.

Assessment instruments, as measurement tools, can help us understand more fully the facets of individuals' digital literacy levels. Several digital literacy-related assessment instruments that have been

used internationally (Hanafizadeha, Hanafizadeh, & Khodabakhshi, 2008, p. 190; Mutula & Brakel, 2006, p. 213). These assessment instruments have helped researchers and practitioners understand the extent to which an individual has a combination of characteristics or exhibits a combination of behaviors needed to be considered digitally literate (Katz, 2007, p. 3). It helps them determine the areas in which an individual needs support. Assessment instruments are also important because they can help researchers identify changes in digital literacy levels over time. In addition, they can guide practitioners in designing interventions to increase levels of digital literacy. Finally, assessment instruments are important because they inform national policy initiatives (Hanafizadeha, Hanafizadeh, & Khodabakhshi, 2008). For example, in 2011, likely motivated by the research showing the increasing number of job and educational opportunities are online, the U.S. Department of Commerce launched http://www.digitalliteracy.gov, a portal to help people living in America gain online skills (United States Department of Commerce, 2011). Another policy initiative motivated by digital literacy related research is the IMLS's 2012 $250,000.00 grant to support libraries' in national broadband efforts (Institute of Museum and Library Services, 2012). In this case, the research alerted them to the fact that: (a) for millions of Americans, libraries are the only places to get help to use the internet and (b) libraries are a trusted community resource that complements at-home connectivity, if one has it.

Microsoft's Digital Literacy Certificate Test is a digital literacy assessment instrument that consists of 30 questions that cover key areas from the five Microsoft digital literacy courses (Computer Basics, The Internet, Cloud Services, and World Wide Web, Productivity Programs, Computer Security and Privacy, Digital Lifestyles) (Microsoft, 2013). Sixty percent of the questions covered in the test are designed to assess cognitive and technology performance based measures. Thirty-three percent are designed to assess social behavioral performance based measures. The focus of the Microsoft's instrument is on basic computing awareness and skills (Microsoft, 2017). Although it is unclear what, if any, framework or frameworks were used to develop their assessment instruments, Microsoft stated that they worked with an expert panel of educators, instructional designers, trainers, and education specialists from around the world to design the assessment instruments. Thus, it is likely they incorporated aspects of one or more of the frameworks discussed here (Microsoft, 2017).

The European / International Computer Driver's License (ECDL / ICDL) is a digital literacy assessment instrument that has three different modules—base, standard and advanced— each with four sections (ECDL, 2017). The base model covers skills having been identified as necessary for anyone using a computer to have. The standard module complements the base module, and is designed to test for knowledge in several areas, including information technology security and online collaboration tools. The advanced module is designed for individuals wanting to demonstrate an in depth knowledge of Microsoft Office's Access, Excel, PowerPoint, and Word. There is documented use of ICDL in several correctional education programs throughout the country. However, its use is limited to issuing students a certificate that indicates that an incarcerated individual has completed a particular class based on the ICDL. There is no licensing option for incarcerated individuals. The ICDL is similar to Microsoft's Digital Literacy Certificate Test in that 66 percent of the questions covered in the test are designed to assess cognitive and technology performance based measures and 33 percent are designed to assess social behavioral performance. The focus of the ECDL's instrument is technological literacy—the use of computers and common computer applications. It is unclear what framework, if any, was used to develop their assessment instruments (CEPIS, 2017). However, like Microsoft, ECDL states that it is the

product of an international taskforce (ECDL, 2017). The ECDL is also focused on helping individuals be able to articulate their competency to potential employers.

Development Dimensions International (DDI) is an international human resource training and consulting company with offices around the world (Development Dimensions International , 2016). DDI developed a digital literacy assessment instrument to measure how well individuals looking for jobs understand computing technology, e.g., differences between hardware and software functions, applications, network types, electronic mail services, and Web browsing techniques and purposes. The instrument incorporates technology and cognitively-based questions to determine a person's level of computer and Internet competence. It is a bit more flexible than the ICDL assessment instrument in that it allows an administrator to customize questions from an index of 250 questions. Information disclosed by the company indicates the assessment instrument is actually designed solely to assess technology-based performance world (Development Dimensions International , 2016).

Certiport is a company that develops performance-based certification exams for academic institutions, workforce and corporate technology markets (Certiport, 2017). It created the Internet and Computing Core Certification (IC3). IC3 is aimed at school-aged students. The assessment is focused on three areas: (1) Computing Fundamental assesses the level of student's understanding of computing; (2) Key Applications assesses a student's performance using popular word processing, spreadsheet, and presentation applications, (3) Living Online covers skills necessary for employment in Internet or other networked environments. The exam takes approximately three hours to complete. IC3 focuses mostly on technology performance. As an assessment instrument, it gives less attention to social behaviors and none at all to affect.

The Northstar Digital Literacy Project assessment instrument is a freely available digital literacy assessment instrument created by the Saint Paul Public Library and Saint Paul Community Literacy Consortium in the late 2000's. The assessment instrument serves as a quick way to assess and quantify digital literacy knowledge among lower-skilled and displaced workers. The instrument is comprised of six areas: Basic Computer Use, Internet, Windows Operating System, Mac OS, Email, and Word Processing ("Northstar Basic Computer Skills Certificate," n.d.). As an assessment instrument, Northstar Digital Literacy primarily measures an individual's understanding of different technologies and what they can do.

The aforementioned instruments exemplify currently available digital literacy assessment instruments. Millions of people have completed digital literacy assessment exams. Interestingly, in contrast to digital literacy models, digital literacy assessment instruments primarily target technology-based performance with slight attention to cognitive or social behavioral based performance. In addition, none of these instruments are designed to assess affect as it relates to digital literacy.

Given the accelerated rate of digital technology development, these assessment instruments are always at risk of obsolescence. The ubiquity and rapid integration of digital technologies into our daily lives and situated environments raise the question as to whether assessment instruments designed using traditional definitions of digital literacy focused on technology-based performance are adequately measuring contemporary levels of digital literacy. Assessment instruments based on holistic frameworks of digital literacy would likely be better able to assess levels of digital literacy because they would consider the cognitive, technological, social behavioral and affective aspects of digital literacy. Furthermore, holistic frameworks acknowledge that there are contextual factors that could render an

individual who is deemed to have be more digitally literate in on situation less digitally literate in another.

2.10 Summary

Frameworks of digital literacy have evolved over time to capture the increasing complexity of what it means to be digitally literate. They have become increasingly complex because of the increasing complexity of the digital environment. However, none of the frameworks, including the five discussed above, are fully holistic, including a cognitive, technological, social behavioral and affective construct. In addition, there are gaps and weaknesses in these frameworks that need to be addressed. First among these is finding a way to account for overlooked cognitive aspects of digital literacy that call on individuals to know about and be able to use digital technologies to support cognitive tasks such as remembering an event or navigating to a location. Next is disentangling the social aspects of digital literacy from the affective aspects. More specifically, explicitly accounting for the social behavior aspects of digital literacy that call on individuals to know about and be able to use social behaviors in digital spaces. Another gap that needs to be addressed by frameworks of digital literacy is accounting for the role of affect in being digitally literate. Finally, none of the current frameworks of digital literacy are directed towards understanding digital literacy in everyday life.

The multiple assessment instruments that have been used to measure digital literacy provide a useful starting point for understanding individuals' digital literacy levels. However, existing instruments have left out aspects crucial to fully understanding and measuring people's everyday digital literacy levels. These digital literacy assessment instruments use overly-narrow frameworks of digital literacy, restricted mostly to the cognitive and technological constructs. This chapter has demonstrated the strengths and weaknesses of existing digital literacy frameworks and the assessment tools based upon them. The most serious weaknesses of existing frameworks are they do not include measure the social behavioral or affective constructs. This dissertation proposes a holistic framework that will address these weaknesses by developing a robust social behavioral and affective construct and supporting indicators and measures. The framework proposed in this dissertation provides a necessary expansion in the conception of digital literacy that will allow researchers to more fully understand the nature of digital literacy and to use in building assessment tools that will capture the full range of capacities and behaviors needed to be digitally literate.

3 The Everyday Digital Literacy Framework

Frameworks, or models, provide a way for researchers to understand and investigate a particular phenomenon. Digital literacy researchers have put forth very few frameworks, particularly those that are holistic. In the previous chapter, I introduced and discussed the most robust holistic digital literacy frameworks that have been published in the field: Eshet-Alkalai (2012), Calvani, Cartelli, Fini & Ranieri (2008), Cartelli and Di Nuzzo (2013), and Ng (2012). Though the frameworks make valuable contributions moving our understandings of digital literacy forward, the frameworks have gaps. The first noticeable gap is the lack of frameworks outside of school-based digital literacy. Next are gaps in the extent of existing frameworks. Eshet-Alkalai (2012) understands that being digitally literacy is a complex phenomenon that encompasses social and affective constructs, yet his framework focuses primarily on the cognitive aspects of digital literacy. Calvani et al.'s (2008) framework does not incorporate a social construct, does not account for affect, and presents an ethical construct that does not include compliance with policies around the use of different digital technologies and digital tools. Cartelli and Di Nuzzo's (2013) framework confounds the technological construct with the cognitive construct, attempts to incorporate a complex classification structure, i.e., taxonomy, into a digital literacy model solely for purposes of creating an additional measurable construct, and includes a meta-construct that is not well defined. Ng's (2012) framework presents a social-emotional construct that overemphasizes cyber-safety and does not fully consider affect.

To address the gaps left by current frameworks, I propose a holistic digital literacy framework comprised of four constructs: (1) cognitive (2) technological (3) social behavioral and, (4) affective. This holistic framework accounts for everyday activities that incorporate the use of digital technologies. Specifically, the framework considers all activities of a person using digital technologies, not just those in schools and places of work. Furthermore, this digital literacy framework includes elements of the social behavioral construct often captured by qualitative researchers, but not fully represented in frameworks or models.

3.1 Constructs & Indicators

Constructs are an important part of all research (Zwanenburg, 2015, p. 3). Although constructs are often included in academic research endeavors, a literature review shows that few researchers define the term *construct* itself. Definitions of the term construct that I discovered in my research include "An abstract concept that describes an idea or phenomenon that is not directly observable" (Furneaux & Wade, 2009, p. 17), and "A psychological label representing clusters or domains of behaviors" (Durante, 2017). I will use both of these as the definition of "construct." In other words, a construct describes an idea or phenomenon that is represented by a cluster or domain of behaviors. The first thing to note about a construct is that it cannot be seen with the naked eye. Next, since it cannot be seen by the naked eye, the presence of a construct is determined by using something else, such as the presence of a particular behavior. In this research, each construct is paired with a cluster of particular behaviors that are called indicators or items (MacKenzie, Podsakoff, & Podsakoff, 2011; Moore & Benbasat, 1991). The definition of construct I will be using assumes that an indicator can be captured through testing or performance evaluation (Cronbach & Meehl, 1955).

The constructs used in the digital literacy frameworks reviewed in the previous chapter include cognitive, ethical, social-emotional, social relational, technical and technological. What sets my framework apart from past frameworks is, first, the explicit focus on everyday life. This is important because nearly all frameworks are centered on schools, which limits the scope and applicability of the frameworks. Furthermore, everyday digital literacy captures a broader range of activities, including those that take place in schools and in the workplace. The other things that set my framework apart are the expansion of the

social behavioral construct and the addition of an affective construct that focuses on the sorts of emotions that characterize how an individual feels about digital technologies and carrying out activities with those digital technologies. Below is a detailed discussion of the four constructs that make up the Everyday Digital Literacy Framework: cognitive, technological, social behavioral and affective. The definitions for the constructs and the sub-constructs are all compiled in a table towards the end of the chapter. See Table 3.2 through

Table 3.5.

Indicators, also called items, dimensions and categories are used to measure constructs and sub-constructs. An indicator is a sign that something you are looking for exists. The process of choosing and defining indicators, which can be qualitative and quantitative in type, is called operationalization. The number of indicators linked to a given construct can vary (Zwanenburg, 2015, p. 3). Although constructs such as age can be measured with one indicator, the measurement of a construct typically involves several indicators. Although there are many types of indicators that can be used to measure constructs, the ones that have received the most attention are reflective measures and formative (composite) measures (Zwanenburg, 2015, p. 4).

In the reflective measurement approach, the constructs are considered most important. A change in the construct necessitates changes in the measurement indicators. In the reflective measurement approach, the reflective indicators must share a common theme, and must express the same idea in different ways, e.g. by using different words and grammatical structures, (Zwanenburg, 2015, p. 5). In other words, the correlation between the reflective indicators should be high. The aim is to maximize the overlap between interchangeable indicators. In doing so, removing any given indicator should not change the nature of the construct. In the formative measurement approach, the indicators are considered most important. A change in the formative indicators will cause the construct to change. In the formative measurement approach, the formative indicators should not share a common theme, they should have as low correlation as possible. The aim is to minimize the overlap between complementary indicators. Thus the formative indicators are different from each other (Zwanenburg, 2015, p. 5) (Kleine-Kalmer, 2016). In the present research the everyday digital literacy framework uses reflective indicators.

In the discussion of the constructs in the Everyday Digital Literacy framework provided below, I examine indicators used in measurement tools used by other researchers. In this context, I mention which of their indicators I will exclude from and which of their indicators I will include to measure the constructs in the Everyday Digital Literacy framework. A full list of indicators with definitions used in the Everyday Digital Literacy framework is provided in the next chapter.

3.2 Cognitive construct

The cognitive construct of digital literacy is defined as *the mentally-based skills and abilities* we use *to plan and execute tasks and goals; those mechanisms by means of which we learn, remember, problem-solve, and focus our attention*. The cognitive construct is present in most models of digital literacy. I am including a cognitive construct in my framework because everyday digital literacy necessitates carrying out cognitive tasks, for example, thinking about and deciding which chatting app (e.g., Canvas, Google Hangouts, Skype, and WhatsApp) is most appropriate for a virtual meeting with friends. Some of these apps are better suited for socializing and others for learning. The cognitive construct is composed of three sub-constructs:

- Embodied cognition
- Critical thinking and decision making.

- Information seeking and use

The first cognitive sub-construct is *embodied cognition*. I define embodied cognition as *using and counting on digital technologies* (e.g. laptops, smart watches, tablets, etc.) *with embedded natural intelligence that learns, remembers, recalls, problem-solves, and directs/manages attention and action*. When describing the sub-constructs constituting the cognitive construct of digital literacy, many authors present the information-related sub-constructs first—namely searching, evaluating, and using information (e.g., Calvani et al. 2010; Eshet, 2012). In fact, they are often the only sub-constructs that most frameworks offer and they minimize the significant impact that digital devices themselves have on one's ability to carry out particular cognitive tasks. They also fail to capture what the sub-construct of embodied cognition offers. Embodied cognition posits that in some situations, cognitive processes extend beyond their traditionally considered boundaries within one's head (Clark, 2008; Menary, 2010; Van Dijk, van der Lugt, & Hummels, 2014; Wilson R. A., 2004). For example, an accountant using a calculator to compute a series of numbers will know the total more quickly than an accountant using a paper and pencil. Embodied cognition demonstrates why people do not internally store information that they expect will be available through technology (Wheeler, 2011). When individuals use a smartphone's GPS navigation application, they are shifting part of the cognitive load to the device. They learn how to calibrate the smartphone app and how to quickly find and access the app when needed instead of learning to read a map or use a compass. During the actual navigation process, a user's cognitive task may be to make sure the GPS navigation application is not leading them in the wrong direction on a one-way street.

Embodied cognition is an important part of being digitally literate. The increasingly dynamic landscape of digital technologies available in everyday life new forms of interaction, for example, recalling the times and dates of your next three medical appointments using automated reminders. It demands that individuals know about the range cognitive processes the digital technologies can perform. As an example, imagine there is a person in a car heading to an unfamiliar location on a snowy afternoon for a medical appointment. The person takes their smartphone out of their pocket, turns the volume up, makes sure location services is turned on so that the smartphone can connect with GPS towers, and opens the smartphones GPS application. Next, the person enters the address of the starting point in the departure field and then enters the end point in the destination field by finding the appropriate information in their smartphone's address book. Then the person presses the appropriate button to start the GPS navigation and places the smartphone in a smartphone holder. The individual follows the GPS applications verbal instructions, while attentively paying attention to dangerous road conditions. In the example above, using a smartphone's GPS navigation application shifts the navigation part of the cognitive load to the device, freeing up the individuals cognitive faculties to support driving a vehicle in dangerous road conditions.

The indicators of *embodied cognition* that I will be using are:

- Can use digital technologies to perform cognitive tasks
- Can use digital technologies to remember information
- Can use digital technologies to recall
- Can use digital technologies to navigate in the physical and virtual world

A second sub-construct under the cognitive construct is *critical thinking and decision making*. This construct, initially called "ways of thinking and doing", is from a framework measuring technological literacy (Gamire & Pearson, Tech tally: Approaches to assessing technological literacy, 2006, p. 36) I define critical thinking and decision making as *the process of asking and seeking answers to questions about digital technologies in a way that allows an individual to obtain the* information *necessary to evaluate and make decisions about whether or not to and how to use digital technologies.* Critical thinking and decision making is concerned with how individuals confront technological issues (Gamire & Pearson, Tech tally: Approaches to assessing technological literacy, 2006, p. 34). For example, an individual with highly developed critical thinking and digital making abilities is likely to think about the benefits and disadvantages of a digital technology, for example, Google Glass (Mundy, 2016) or Facebook's facial recognition search feature (Lachance, 2016). The individual might find the fact that pictures can be taken with Google Glass with a head or eye movement, or voice command without the need of taking out a cell phone or camera from a pocket or bag as a benefit. On the other hand, the individual might find the fact that people never know if and when they are being recorded by Google Glass, as a disadvantage. Furthermore, critical thinking ability implies that the individual can participate in discussions related to digital technologies. Gamire & Pearson's depiction of critical thinking and decision-making is aligned with the representation of my cognitive construct (Gamire & Pearson, Tech tally: Approaches to assessing technological literacy, 2006, p. 82) and with how scholars of digital literacy often describe activities individuals need to do. For example, Ng (2012, p. 46) incorporates the essence of this construct into his digital literacy framework.

The indicators of critical thinking and decision making that I will be using are:

- Asks and answers pertinent questions, of self and others, regarding the benefits and risks of technologies.
- Weighs available information about the benefits, risks, costs, and trade-offs of technology in a systematic way.
- Participates, when appropriate, in decisions about the development and uses of technology.

Adapted from (Gamire & Pearson, Tech tally: Approaches to assessing technological literacy, 2006, p. 34)

The third sub-construct under the cognitive construct is *information seeking and use*. I define information seeking and use as *the ability to use digital technologies in order to engage with multiple sources of information (e.g. text, video, audio, images).* As an example of *information seeking and use,* imagine someone's driver's license has expired and needs to be renewed online. The goal of renewing a license online requires that the individual recognizes the need for renewal; identifies potential web sources that would be useful for gathering information about the process of doing so; evaluates the reliability, currency, and accuracy of the information presented on the websites and finally carries out the steps necessary to successfully renew a license online.

Definitions of information literacy align closely to information seeking and use. The majority of definitions of information literacy are from the discipline of library and information science. For example, a widely recognized definition of information literacy is that provided by the American Library Association (ALA), originally published in a report of the ALA Presidential Committee on Information Literacy in 1989:

> *To be information literate, a person must be able to recognize when information must be able to recognize when information is needed and has the ability to locate, evaluate, and use effectively the needed information. Ultimately, information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand (*American Library Association Presidential Committee, 1. 1989)

This seminal definition developed for a very different context is still very relevant in the 21st century.

The information seeking and use sub-construct of the proposed digital literacy framework is also inspired by TRAILS (Tools for Real-time Assessment of Information Literacy Skills). TRAILS is a web-based knowledge assessment tool introduced by Kent State University Libraries in 2004 (About TRAILS, n.d.). TRAILS was developed using the American Association of School Librarians' Standards for the 21st-Century Learner and those from the Common Core State Standards Initiative in order to measure information literacy. It uses multiple-choice questions to assess elementary and high school students' information literacy levels. I selected TRAILS for two reasons: (1) the constructs and their definitions provided were the most comprehensive of those I had reviewed and (2) the assessment tool has been validated. I have extracted and synthesized definitions of constructs found in the TRAILS documentation to create the information seeking and use sub-construct.

The indicators of information seeking and use that I will be using are:

- Recognizes what information they need and articulate that (develop a topic)
- Identifies and uses the most appropriate tools (identify potential sources)
- Uses features of the tools to search for and retrieve information (develop, use and revise search strategies)
- Assesses the information and the source (evaluate sources and information) and
- Knows how to use information in ways that does not violate any laws and is not considered dishonest (use information responsibly, ethically, and legally

To summarize, the cognitive construct has three sub-constructs:

(a) *Embodied cognition*: Using and counting on digital technologies with embedded natural intelligence that learn, remember, recall, problem-solve, and direct/manage attention and action.

(b) *Critical thinking and decision making*: Asking and seeking answers to questions about digital technologies in a way that allows an individual to obtain the information necessary to make decisions about whether or not to and how to use digital technologies

(c) Information seeking and use: Activities requiring individuals to use digital technologies to engage with multiple sources of information (for example text, video, audio, images)

Collectively these three sub-constructs represent a holistic view of the cognitive construct of digital literacy in everyday life.

3.3 Technological construct

The technological construct of digital literacy is defined as the *expertise necessary to make use of a range of different digital technologies across different contexts and for different purposes.* The technological construct is a feature of all digital literacy models. I am including a technological construct in my framework because digital literacy, regardless of the context, demands that an individual is able to make use of a range of digital technologies (Calvani, Cartelli, Fini, & Ranieri, 2008, p. 187; Cartelli, Dagiene, & Futschek, 2010; Gamire & Pearson, 2006, p. 33; Judson, 2010, p. 272; Marcum & O'Shea, 2010, p. 2671). For example, an individual with a smartphone must know how to insert a SIM card into a smartphone and charge the smartphone. The technological construct has three sub-constructs:

- Awareness
- Knowledge
- Capabilities

The first technological sub-construct is *knowledge*. I define knowledge, as it relates to the technological construct, as *understanding digital technologies and how they work.* In other words, it involves having factual knowledge and a conceptual understanding. There are several indicators of technological knowledge. Some of the indicators that I will be using are from Gamire & Pearson's knowledge construct (2006). Those indicators represent the results of a two-year study sponsored by the National Academy of Engineering and the National Research Council to develop a technological literacy assessment tool. They included several indicators in their knowledge construct. The ones that I have selected to include in my framework are:

- Recognizes the pervasiveness of technology in everyday life.
- Knows that all technologies entail risk, only some of which can be anticipated.
- Basic knowledge about technology.

I am using these three because as indicators of technological knowledge because they reflect the essence of what has been captured in the studies exploring digital technologies and knowledge. For example, it is reasonable to assume that a person who recognizes that technology is used for trivial and non-trivial activities will be more digitally literate than someone who does not recognize this.

Another technological sub-construct is *capabilities*. I define capabilities as the *ability to perform certain actions or outcomes with digital technologies.* It posits that the technological knowledge that one possesses is parallel to what one can do with digital technologies. The indicators of technological capabilities put forth by Gamire & Pearson that I will be using are:

- Has a range of hands-on abilities, such as operating a variety of digital devices and using a computer for word processing and surfing the Internet.
- Can identify and fix simple technological problems
- Can obtain information about technological issues of concern from a variety of sources (Gamire & Pearson, Tech tally: Approaches to assessing technological literacy, 2006, pp. 34-35).

These indicators are robust enough to capture all aspects of the capabilities sub-construct. There are two indicators that Gamire & Pearson list that I find problematic and outside of the scope of digital literacy. These include:

- Can apply basic mathematical concepts related to probability, scale and estimation

- Can use design-thinking process to solve a problem encountered in daily life

The issue with both of those indicators is that they require very specialized knowledge that the literature has not demonstrated would fall within the purview of day-to-day activities with digital technologies. The first bulleted item is an indicator of mathematical literacy. Design thinking (p. 33; p. 41), the second bullet, has some parallel features with indicators found in the cognitive construct. However, design thinking is a formal process used to develop products and interventions and it is unlikely to be known outside of these contexts.

The third technological sub-construct is *awareness*. I define awareness as *recognizing the existence of some artifact related to a digital technology or an activity that occurs in the digital environment*. As an example of awareness, imagine there is an individual who is preparing a forty-five minute math lesson for a group of students. As part of her lesson she has students use their mobile devices to respond to math question polls whose results are immediately computed synthesized and displayed on a projector in the class. During the class she attempts to broadcast a video from her work computer, but the connection was poor. One of her student informs her that she can broadcast from her smartphone directly to the projector using a Digital Media Streamer (for example Google Chromecast and Amazon Fire). The student walks her through the process and she loads and projects the videos from her personal smartphone. In the example above, the instructor conscious with respect to the available technologies and its basic purpose—awareness. To become aware one must be exposed to the digital technologies.

Although awareness was mentioned in several of the articles reviewed in Chapter 2 (for example (Johnson, Edmundson-Bird, & Keegan, 2012), the frameworks analyzed did not explicitly account for it. It is taken for granted that everyone is aware of the different sorts of digital technologies that exist. However, this assumption is misplaced. A 2016 Pew Report states that 13% of people living in the U.S. do not use the Internet. Although this is a huge decrease compared to statistics from 2000, when nearly half of the adults living in the U.S. did not use the Internet, it still represents a significant number of individuals who do not know how to use the Internet (Anderson & Perrin, 2016). Another reason that it is important to include awareness as a sub-construct is that awareness is distinct from knowledge. The sorts of interventions an institution may put in place to increase digital literacy levels for people who are aware of digital technologies and tools is different from interventions for those who are unaware of digital technologies and tools.

To summarize, the technological construct has three sub-constructs:

- *Awareness:* Recognizing the existence of some artifact related to a digital technologies or an activity that occurs in the digital environment
- *Knowledge:* Understanding digital technologies and how they work
- *Capabilities:* Ability to perform certain actions or outcomes with digital technologies

Collectively these three sub-constructs represent a more holistic view of the technological construct of digital literacy in everyday life.

3.4 Social behavioral construct

The social behavioral construct of digital literacy is defined as *behaviors mediated by digital technologies that involve asynchronous or synchronous interactions with one or more persons*. None of the

frameworks of digital literacy that I could find includes this construct. I am including a social behavioral construct in my framework because everyday digital literacy includes communicating and socializing with other via digital technologies. Such activities include sending emails, creating videos, sending messages, getting recommendations, and requesting online help. People use digital technologies to find and give feedback about restaurants and clothing, and to participate in group chats, and in asynchronous and synchronous education platforms. Digital technologies are used to communicate with government officials and medical professionals. In comparison to other aspects of digital literacy, the social behavioral aspect is under-studied. However, it is an important aspect to study because digital technologies used to negotiate various types of social interactions are prevalent and use of them is growing. For example, research conducted by Brenner & Smith (2013) estimates the adult use of social networking sites has increased from 67% in 2012 to 72% in 2013 (2013, p. 2). Given that digital technologies are used to facilitate a range of social activities, it is important to call out a social behavioral construct in a framework of digital literacy.

Although the literature review did not elicit a framework of digital literacy with a social behavioral construct, it did elicit frameworks that included constructs that capture some narrow aspects of the social behavioral dimension presented here. For example, Calvani et al.'s (2008) digital literacy model included an ethical construct that is defined as "the ability to interact with other individuals constructively and with sense of responsibility using available technologies." As another example, Cartelli and Di Nuzzo (2013) includes a social-relational construct that is narrow because it is constrained to social behaviors that occur within hierarchal structures of power relations. For example, the taxonomy they put forth for of the indicators they include in their taxonomy are: (1) leadership (2) followership (3) role exchange in a yielding direction and (4) role exchange in an assertive direction. Similarly, Eshet-Alkalai (2012) includes a socio-emotional construct and focuses on the cognitive aspects of this construct. Although Ng (2012) includes a social-emotional construct and recognizes the social behavioral construct as encompassing communicating, socializing and learning, his discussion on the topic focuses primarily on the safety. The lack of an existing social behavioral construct of digital literacy that includes a broad range of behaviors is a serious limitation of current holistic frameworks.

I started the process of developing a robust social behavioral construct of digital literacy by looking for indicators of social skills that had been identified in previous research. The most promising indicators that I identified dealt with social behaviors in the offline environment. The sub-constructs of the social behavioral construct that I am adapting for this research come from a meta-analysis of 21 studies involving over 22,000 participants conducted by Caldarella & Merrell (1997). Caldarella & Merrell capture a broader range of behaviors than is captured by current digital literacy frameworks. Identifying a broad range of behaviors is important because it can lead to a more accurate representation of the social behaviors a digitally literate individual engages in when using digital technologies. Calderella & Merrell's five sub-constructs are:

- Peer relationship behaviors, defined as behaviors that increase the probability of successfully establishing and maintaining interpersonal relationship with peers;
- Self-management behaviors, defined as behaviors that reflect the regulation and control of one's own behavior in accordance with external and internal rules;
- Academic-related behaviors, defined as behaviors that increase the probability of success in academic learning;
- Compliance behaviors, defined as behaviors that conform to rules and expectations; and

- Assertion behaviors, defined as behaviors that reflect the ability to appropriately express personal thoughts, feelings, opinions and rights.

(McGrew, Johnson, Cosio, & Evans, 2004, p. 80)

An analysis of the five sub-constructs reveals some problems as well as some narrowness of scope that do not work well for a more holistic framework. One of the major problems is that some of the indicators in one construct appear in other constructs. For example, there are several indicators in the assertion behaviors construct that are worded very similarly or exactly the same as those in the peer relationship sub-construct. The phrases "invites peers to play…" and "makes friends …" appeared in the peer relationship and assertive sub-constructs. I also found indicators classified by Caldarella & Merrell (1997) in one construct that appeared to be better suited for another construct. For example, they classified "stands up for rights of peers, defends a peer in trouble" as peer relationship, whereas I would classify it as assertion; they classified "follows rules, accepts imposed limits" as self-management whereas I would classify it as compliance; and they classify "cooperates with others in a variety of situations" as self-management whereas I would classify it as peer relationship. There are also indicators that are too narrowly defined for a holistic framework of everyday digital literacy, for example, the academic behavior construct that reads "listens to and carries out teacher directions" refers specifically to a school environment.

I use Caldarella & Merrell's definitions for the five sub-constructs as a basis for my definitions because they are broad and relatively complete. However, based on my analysis, I categorize the indicators in a slightly different, but more rigorous way and I will exclude several behaviors. The first set of behaviors I will exclude are:

- Is sought out by peers to join activities, everyone likes to be with (peer relationship skills)
- Has good leadership skills, assumes leadership role in peer activities (peer relationship skills)
- Introduces self to new people (assertion)

These are being excluded because they are captured by behaviors in either the peer relationship and assertion constructs. The next set of behaviors I exclude are:

- Appears confident with opposite sex (assertion skills)
- Acknowledges compliments (assertion skills)
- Questions unfair rules (assertion skills)
- Says and/or does nice things for self, is self-confident (assertion skills)
- Initiates conversations with others (assertion skills)
- Invites peers to play, invites others (assertion skills)
- Has skills or abilities admired by peers, participates skillfully with peers (peer relationship skills)
- Has sense of humor, shares laughter with peers (peer relationship skills)
- Is personally well-organized (e.g. brings required materials to school, arrives at school on time) (academic skills)
- Listens to and carries out teacher directions (academic skills)

These are being excluded because there is no evidence in the literature that they are related to an individuals' digital literacy level. The next set of behaviors I exclude are:

- Produces work of acceptable quality for ability level, works up to potential (academic skills)

- Uses free time appropriately (academic)

These are being excluded because determining whether or not they are present is subjective.

In addition, I have added behaviors not captured in the Calderella and Merrell's meta-analysis. Those behaviors are:

- Regularly communicates online with peers
- Uses language that is appropriate while online
- Shares content online with others
- Focuses on tasks despite receiving unrelated notifications or messages
- Follows rules about using software, websites and apps

The result of the analysis process maintains Calderella and Merrell's five sub-constructs but presents a considerably revised and reorganized set of indicators for the everyday digital literacy framework. See Table 3.1.

Table 3.1: The Everyday Digital Literacy Social Behavioral Construct

Peer relationships	Compliments/praises/applauds peers Offers help or assistance to peers when needed Invites peers to play/interact Participates in discussions, talks with peers for extended periods Skillfully initiates or joins conversations with peers Is sensitive to feelings of peers (empathy, sympathy) Makes friends easily, has many friends Has sense of humor, shares laughter with peers Regularly communicates online with peers
Self-management	Remains calm when problems arise controls temper when angry Compromising with others when appropriate, compromises in conflicts Receives criticism well, accept criticism from others Responds to teasing by ignoring peers, responds appropriately to teasing Uses language that is appropriate while online Shares content online with others
Academic	Accomplishes tasks/assignments independently, displays independent study skills Completes individual seatwork/assigned tasks Appropriately asks for assistance as needed, asks questions Ignores peer distractions while working, functions well despite distractions Focuses on task despite receiving unrelated notifications or messages
Compliance	Follows instructions/directions Follows rules Follows rules about using software, websites and apps
Assertive	Initiates conversations with others Invites peers to play, invites others Says and/or does nice things for self, is self-confident Expresses feelings when wronged Appropriately joins ongoing activity/group

A social behavioral construct is necessary for a holistic framework of digital literacy. Although there have been previous attempts to include constructs that resemble a social behavioral construct, they have all been too narrow to be truly holistic. The five sub-constructs presented in this section, adapted from Caldarella and Merrell's (1997) work, propel us towards a more holistic view of digital literacy in everyday life.

3.5 Affective construct

The affective construct is defined as *emotions or feeling about digital technologies and carrying out different activities using digital technologies*. The affective construct was included in Cartelli's (2012) framework of digital literacy as a way of talking about how people arrive at affective states when using digital devices. Some of the other frameworks discussed affect to a lesser extent. Eshet-Alkalai (2012) and Ng (2012) talked about social-emotion as a digital literacy construct that can help individuals stay safe which engaging in social activities using digital technologies. The interest in measuring the affective dimension of technology use is increasing (Garland & Noyes, 2008, p. 565). I am including an affective construct in my framework because a person's affective state affects their digital literacy level. This includes positive and negative emotions and feelings, for example, being confused, frustrated or satisfied. Affective state includes feelings individuals have about the impact of computers on society and the quality of their lives, and their understanding of computers. This also includes states that result in a resistance to and avoidance of computer technology. These feelings include "…fear and apprehension, intimidation, hostility, and worries, that one will be embarrassed, look stupid, or even damage the equipment" (Heinssen Jr., Glass, & Knight, 1987, p. 50).

A person's affective state is influenced by the number of encounters they have with digital devices (Durndell & Haag, 2002, p. 529; Powell, 2013, p. 2338; Serrano-Puche, 2015, p. 6; Tsai, Lin, & Tsai, 2001, p. 47). For example, researchers have reported that adults and youths who had a negative feeling towards computers and the Internet avoid using them or are less confident in their capacity to use them and make progress (Cazan, Cocorada, & Maican, 2015). They experience feelings of discomfort, frustration, and stress (Cazan, Cocorada, & Maican, 2015, p. 258).

The affective domain used in my framework is inspired by the affective portion of Carol Kuhlthau's Information Search Process model (ISP). Kuhlthau's model does not focus on the affective construct alone, and is discussed in relation to thoughts and actions (Savolainen, 2014). Kuhlthau's affective construct identified feelings associated with different stages of the information search process (Kuhlthau C. C., 2004). Kuhlthau published a series of five studies between 1983 and 1991 describing the evolution of the ISP model and its validation across several user groups (Kuhlthau C. C., 1983; Kuhlthau C. C., 1988; Kuhlthau C. C., 1989; Kuhlthau C. C., Inside the search process: Information seeking from the user's perspective, 1991). The ISP model was influenced by George Kelly's personal construct theory that describes the emotional experience of using new information to construct meaning (Kracker, 2002, p. 283). Kelly described this emotional experience as a series of sequential phases, starting with confusion (Kelly, 1963). As the individual comes in contact with information, they use the information to shape their understanding of the world around them. Similarly, Kuhlthau assumed that affective experiences play a significant role throughout the process of construction and information seeking and was the first to describe emotions as a natural part of the research process (Kracker, 2002, p. 283).

Kuhlthau's affective dimension was constructed using journal entries, one-on-one interview data and search logs of research participants (Kuhlthau C. C., 1983). From the analysis, Kuhlthau posited that every step of the ISP is associated with specific feelings. In total, she found seven categories of emotions that matched the seven categories of the information search process:

1. Uncertainty (task definition)
2. Optimism (topic selection)
3. Confusion/frustration/doubt (pre-focus exploration)

4. Clarity (focus formulation)
5. Sense of direction/confidence (information collection)
6. Relief (search closure)
7. Satisfaction or dissatisfaction/ sense of accomplishment (start writing)

The seven categories represented 11 distinct feelings. Those feelings included:

1. Uncertainty
2. Optimism
3. Confusion
4. Frustration
5. Doubt
6. Clarity
7. Sense of direction
8. Confidence
9. Relief
10. (Di)Satisfaction
11. Sense of Accomplishment

(Kuhlthau C. C., 2016)

As strong as it is, there are weaknesses in Kuhlthau's research. Nowhere in her work does Kuhlthau actually define the feelings, which makes it difficult know whether what people are actually experiencing is the feeling that is being identified. For example, Kuhlthau (1989, pp. 20-21) states that the first stage of the ISP is characterized by feelings of uncertainty. However, the following quotations representing uncertainty from Kuhlthau's dissertation gives a different impression:

> D--When I first hear about an assignment personally I just get *upset*. I say why now and I don't want to do this.
>
> K--I feel *depressed* and *bogged-down* because I have other courses.
>
> C--First I *don't want to* do it. It means work and hours in the library . . . . It's a spontaneous kind of *fear*.
>
> D--In the real beginning I guess I was like everyone else, I didn't know what I wanted to do. I guess I was *annoyed* at the thought of doing a research paper because of the time it would take . . . I felt *anxious*.

(Kuhlthau C. C., 1983, p. 199)

The words highlighted in the quotations indicate that students had experienced a range of feelings, not just uncertainty. Next, there are indicators that are very similar and overlap with other indicators. The indicators of Kuhlthau's affective construct that are closely related were: uncertainty, confusion, and doubt. These are all negative affective states associated with not knowing something. Of the three, I am adopting confusion because it is a term that appears often in the literature and is easy to understand. Next, based on my literature review, which highlights the feelings associated with lower levels of digital literacy, I am excluding the following categories: clarity, disappointment, optimism, relief, sense of accomplishment, and sense of direction. I am not including these categories because I believe the categories I am including capture the range of feelings people have been shown to experience as the

relate to using digital technologies. Excluding these other categories will also make the number of affective items of emotions more manageable.

Kuhlthau's (1989) deductive work developing an affective construct was instrumental in shaping the categories included in the affective construct of the everyday digital literacy framework. The affective construct differs from the other constructs because it is interested in understanding the emotions individuals have when about digital technologies and carrying out tasks with digital technologies. Another feature that makes this construct different it is not focusing on whether or not one can actually carry out a behavior. Finally, the construct is calling on individuals to identify their effective state. This construct will be measured by asking individuals to state their feeling as it relates to an aspect of the other three constructs. The affective construct consists of the following affective values:

- **Confused:** Feeling like you do not understand.
- **Frustrated:** Feeling that something should work one way, but it does not.
- **Confident:** Having strong belief, firm trust, or sure expectation; feeling certain, fully assured, sure.
- **Afraid**: Feeling scared of the consequence of using digital technology in a certain way (for example, that you will break something, you will do something wrong) **Invalid source specified.**.
- **Satisfied:** Feeling or showing a sense of pleasure or happiness.
- **Anxious:** Feeling unsure and worried or nervous about how something will turn out.

The list of values above will be used to determine individuals' affective. Most of that research is very general and does not explore affective states as specific as those presented in the work of Kuhlthau (1989) and Kay (1993). For example, in 2016 Cazan et al. (2015, p. 264) reported that Romanian students who participated in an Information and Communications Technology course had less anxiety about computers and the Internet than others. Some of the values that will be used to measure the presence of affective states included in my affective construct are derived from existing instruments looking at feelings people have related to digital technologies. For example, my "Confident" indicator reflects Heinssen Jr. et al.'s (1987) "I do not think I would be able to learn a computer programming language" and "I am confident that I can learn computer skills." Similarly, my "Afraid" category captures the affective states present in Heinssen Jr. et al. "I am afraid that if I begin to use computers I will become dependent upon them and lose some of my reasoning skills" and "It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key."

An affective construct is necessary for a holistic framework of digital literacy. The work of Kuhlthau (1989), Kay (1993), Cartelli (2012) and others has laid the foundation enabling me to develop a detailed affective construct that moves us towards the goal of understanding digital literacy in everyday life.

3.6 The Everyday Digital Literacy Framework

The technological advances that have taken place in the last 20 years, most notably the increased access and ownership of computers and mobile devices and the growth of the Internet, have had a profound impact on peoples' lives. There are everyday digital literacy practices that everyone must engage in order to function successfully; being able to use digital technologies across contexts is the bedrock of digital literacy. To ensure that people have the digital literacy levels necessary to participate in our society, it is critical that we have a good understanding of what everyday digital literacy is. The everyday digital literacy framework presented here attempts to do just that.

To summarize from above, the everyday digital literacy framework contains four main constructs. Those constructs are: cognitive*,* technological*,* social behavioral *and* affective*. Together, they give us a broad understanding of an individuals' everyday digital literacy level. See Table 3.2 through*

Table 3.5.

The *cognitive construct* deals with mentally-based skills and abilities and consists of three sub-constructs. Those sub-constructs are *embodied cognition*, *information seeking and use*, and *critical thinking and decision making*.

The *technological construct* deals with the expertise necessary to use technologies and consists of three sub-categories. Those sub-categories are *awareness*, *knowledge* and *capabilities*.

The *social behavioral construct* deals with the behaviors mediated by digital technologies that an individual engage in and consists of five sub-constructs: *peer relationship*, *self-management*, *academic*, *compliance*, and *assertion*.

The *affective construct* deals with feelings people have about digital technologies and about carrying out tasks using digital technologies.

Table 3.2: Cognitive construct - Magassa's Everyday Digital Literacy Framework (2020)

Construct	Construct definition	Sub-construct	Sub-construct definition
Cognitive	The mentally-based skills and abilities we use to plan and execute tasks and goals; those mechanisms by means of which we learn, remember, problem-solve, and focus our attention		
		Embodied cognition	Using and counting on digital technologies with embedded natural intelligence that learn, remember, recall, problem-solve, and direct/manage attention and action
		Critical thinking and decision making	Asking and seeking answers to questions about digital technologies in a way that allows an individual to obtain the information necessary to evaluate and make decisions about whether or not to and how to use digital technologies
		Information seeking and use	Activities requiring individuals to use digital technologies to engage with multiple sources of information (for example text, video, audio, images)

Table 3.3: Technological construct - Magassa's Everyday Digital Literacy Framework (2020)

Construct	Construct definition	Sub-construct	Sub-construct definition
Technological	The expertise necessary to make use of a range of different digital technologies across		

	different contexts and for different purposes		
		Awareness	Recognizing the existence of some artifact related to a digital technology or an activity that occurs in the digital environment
		Knowledge	Understanding digital technologies and how they work
		Capabilities	Ability to perform certain actions or outcomes with digital technologies

Table 3.4: Social behavioral construct - Magassa's Everyday Digital Literacy Framework (2020)

Construct	Construct definition	Sub-construct	Sub-construct definition
Social behavioral	Behaviors mediated by digital technologies that involve asynchronous or synchronous interactions with one or more persons		
		Peer relationship	Behaviors that increase the probability of successfully establishing and maintaining interpersonal relationship with peers
		Self-management	Behaviors that reflect the regulation and control of one's own behavior in accordance with external and internal rules
		Academic	Behaviors that increase the probability of success in academic learning
		Compliance	Behaviors that conform to rules and expectations
		Assertion	Behaviors that reflect the ability to express personal thoughts, feelings, opinions and rights

Table 3.5: Affective construct - Magassa's Everyday Digital Literacy Framework (2020)

Construct	Construct definition	Sub-construct	Sub-construct definition
Affective	Emotions or feeling about digital technologies and carrying out different activities using digital technologies		

3.7 Summary

Digital technologies are at the center of our lives and are used for a wide array of professional, personal, and leisure activities. Researchers agree that an individual with a high level of digital literacy has a rich understanding of the digital tools, and can use the Internet in ways that people with lower levels of digital literacy cannot. Frameworks, or models, provide a way for researchers to understand and investigate digital literacy. The most holistic digital literacy frameworks that exist have been reviewed here (Calvani, Cartelli, Fini, & Ranieri, 2008; Cartelli, 2012; Eshet-Alkalai, 2012; Ng, 2012). These frameworks have made significant contributions to our understanding of digital literacy. However, they leave significant gaps, the most important of which is that they do not address digital literacy in everyday life. The major contribution of my work is that it is a detailed framework that presents a method of measuring everyday digital literacy.

The everyday digital literacy framework introduced here is based on an extensive literature review and analysis of existing holistic frameworks. It attempts to capture the use of current digital devices as well as include all of the aspects of digital literacy that are needed to describe a digitally literate person in everyday life. It contains four main constructs: cognitive, technological, social behavioral, and affective.

4 Methods

The first purpose of this research is to validate a holistic framework of digital literacy proposed to expand the conception of digital literacy to incorporate day-to-day life activities. The frameworks constructs and associated items are developed based on an analysis of the existing literature. The framework is refined and validated through a conceptual card sorting activity. The card sorting activity facilitates the creation of a set of questionnaire items to measure the digital literacy levels of formerly incarcerated individuals.

The next purpose of the research is to learn about the digital literacy level of formerly incarcerated individuals by surveying them using the questionnaire. The Flesch-Kincaid Reading Scale test shows that the questionnaire booklet written at a 7th grade level. Written at this level increases the likelihood that participants can understand the questionnaire. Next, the questionnaire I examine in two focus group interviews sessions. The focus group interviews help refine the questionnaire items and get feedback on the different aspects of the questionnaire items, for example, clarity of instructions. I use the final version of the questionnaire use to collect data from previously incarcerated individuals. In the sections that follow, I provide a more in-depth discussion about the three research methods—card sorting, focus group interviews, and data collection—used in this study.

4.1 Research questions

As described in previous chapters, a more robust holistic framework of digital literacy is needed. Existing frameworks have limitations that negatively influence their ability to measure a persons' digital literacy level as they engage in everyday activities with digital devices. The framework, everyday digital literacy, discussed in the previous chapter, posits that an individuals' everyday digital literacy level is composed of a cognitive, technological, social behavioral and affective construct.

In the literature review, I examined the research interested in learning more about the digital literacy level of marginalized groups in our society. Although the need for all individuals to be digitally literate has been articulated many times, very little is known about the digital literacy levels of formerly incarcerated individuals. The proposed research addresses the need to understand how digitally literate formerly incarcerated people are, which can give us an indication of how successfully they transition back into society. By examining formerly incarcerated individuals' digital literacy levels using the proposed framework, I have an opportunity to represent that digital literacy levels of an important, but often overlooked segment of our society.

The purpose of this research is to (a) create and validate a holistic framework of digital literacy, and (b) measure the digital literacy levels of formerly incarcerated individuals using the proposed framework.

The following research questions guide this research:

- What is the composition of a holistic framework of everyday digital literacy?
- What are the digital literacy levels of formerly incarcerated individuals based on measures derived from the proposed framework?

In this chapter, I describe how I answer the second research question.

4.2 Self-report questionnaire development

The framework described in the previous chapter facilitates the design of a questionnaire that measures the presence and level of everyday digital literacy. Each questionnaire item reflects a construct of the everyday digital literacy framework introduced in the previous chapter. The development of the questionnaire moves me towards to fulfilling two goals. One goal is to develop a questionnaire that has high validity. This is important because it demonstrates that the information collected using the questionnaire is credible. Another goal is to collect information about formerly incarcerated individuals' digital literacy levels. This is important because other studies do not include this as a focus of their research.

Cognitive items

The cognitive construct of digital literacy is defined as the mentally based skills and abilities we use to plan and execute tasks and goals; those mechanisms by means of which we learn, remember, problem-solve, and focus our attention. The cognitive construct is composed of three sub-constructs:

- **Embodied cognition:** Using and counting on digital technologies with embedded natural intelligence that learn, remember, recall, problem-solve, and direct/manage attention and action
- **Critical thinking and decision making:** Thinking about and seeking answers to questions about digital technologies that inform decisions about whether to and how to use digital technologies
- **Information seeking and use:** Looking for and using information (for example text, video, audio, images) found through digital technologies

The table below presents the cognitive sub-constructs and the corresponding questionnaire items.

Table 4.1: Embodied cognition sub-construct items and indicators

Cognitive construct	
Embodied cognition (14 items)	
Questionnaire item(s)	Indicators
1. I use digital technology to help me remember things. 2. I use digital technology to do calculations. 3. I use digital technology to look up information. 4. I use digital technology to learn. 5. I use digital technology to make decisions. 6. I use digital technology to fix words I spell wrong.	Can use digital technologies to perform cognitive tasks (6 items).
7. I use digital technologies to remind me of important events. 8. I use digital technologies to remember birthdates. 9. I use digital technologies to remind me to do things. 10. I use digital technologies to remind me about my appointments.	Can use digital technologies to remember (recall) information (4 items).

11. I use digital technologies to get to (places I shop) stores. 12. I use digital technologies to get to appointments. 13. I use digital technologies to get to events. 14. I use digital technologies to get to meetings.	Can use digital technologies to navigate in the physical world (4 items).

Table 4.2: Critical thinking and decision making sub-construct items and indicators

Critical thinking and decision making (19 items)	
Questionnaire item(s)	Indicators
1. I ask others about how my privacy is impacted by digital technologies. 2. I ask others about how using digital technologies affects my relationships with people. 3. I ask others about the benefits of using digital technologies. 4. I ask others about the risks of using digital technologies.	Asks and answers pertinent questions, of self and others, regarding the benefits and risks of technologies.
5. I answer people's questions about the benefits of using digital technologies. 6. I answer other people's questions about the risks of using digital technologies. 7. I think about the benefits of using digital technologies. 8. I think about the risks of using digital technologies. 9. I think about how my privacy is affected by digital technologies. 10. I think about how I use digital technologies affects my relationships with people I know. 11. I follow a process when I am trying to figure out if I should buy a particular technology. 12. I follow a process when I am trying to figure out if I should use a particular Internet site. 13. I follow a process when I am trying to figure out if I should use a particular app.	Weighs available information about the benefits, risks, costs, and trade-offs of technology in a systematic way.
14. I discuss the security features of digital technologies to decide if I should use it. 15. I discuss the benefits of digital technologies to decide if I should use it. 16. I discuss the negative risks associated with using the Internet to decide what Internet sites to visit. 17. I discuss the benefits associated with using the Internet to decide what Internet sites to visit. 18. I discuss ways to use digital technologies that their creators may not have intended. 19. I share my opinions about how I believe a technology should work when it does not work the way I expect.	Participates, when appropriate, in decisions about the development and uses of technology.

Table 4.3: Information seeking and use sub-construct items and indicators

Information seeking and use (18 items)	
Questionnaire item(s)	Indicators
1. I can tell if my search words will get me information, I need. 2. I know what do if my search words are not getting me the information I need. 3. I can come up with useful search words. 4. I can figure out what information I need.	Recognizes what information they need and articulate that (develop a topic).
5. I can use Internet tools to get the things I need. 6. I can recognize tools that will get me information in the format (for images, documents, and videos) I need. 7. I can recognize tools that will not help me get the information I need.	Identifies and uses the most appropriate tools (identify potential sources).
8. I know how to choose information in a format (article, picture, video, etc.) that will help me best. 9. I know how to change search words if I am having problems find the information I want. 10. I know how to modify search words to look for specific types of information.	Uses features of the tools to search for and retrieve information (develop, use and revise search strategies).
11. I know if information I am looking at on the Internet real or fake. 12. I can quickly look at information on the Internet and tell if it will answer my question. 13. I know how to find out if something I am looking at on the Internet is real or fake. 14. I can tell where information on Internet comes from.	Assesses the information and the source (evaluate sources and information).
15. When I use information found on the Internet, I include the URL so other people can find it. 16. I know how to use the information I find on the Internet in a way that does not break the law. 17. I know how to present information on the Internet so people know what I copied. 18. I know how to present information on the Internet so people know where I found it.	Knows how to use information in ways that does not violate any laws and is not considered dishonest (use information responsibly, ethically, and legally).

Technological items

The technological construct of digital literacy is defined in the framework as *the expertise necessary to make use of a range of different digital technologies across different contexts and for different purposes*. The technological construct has three sub-constructs:

- **Awareness:** Recognizing the existence of some artifact related to a digital technology or an activity that occurs in the digital environment
- **Knowledge:** Understanding digital technologies and how they work
- **Capabilities:** Performing certain actions or creating specific outcomes with digital technologies

Table 4.4 through

Table 4.6 below present the technological sub-constructs and the corresponding questionnaire items.

Table 4.4: Awareness sub-construct items and indicators

Technological construct	
Awareness (7 items)	
Questionnaire item(s)	Indicators
1. I have heard about computers and laptops. 2. I have heard about smartphones. 3. I have heard about the Internet. 4. I have heard about social media. 5. I am aware that files can be downloaded from the Internet. 6. I am aware that digital devices have security settings. 7. I am aware that it is possible to buy items from the Internet.	Recognizes the existence of technology in everyday life.

Table 4.5: Knowledge sub-construct items and indicators

Knowledge (16 items)	
Questionnaire item(s)	Indicators
1. I know what things computers and laptops are good at doing. 2. I know what things smartphones are good at doing. 3. I know the difference between operating systems and software applications. 4. I know the difference between a cellular network and Wi-Fi network. 5. I know how to troubleshoot technology issues. 6. I know what a mouse is. 7. I know what keyboard shortcuts are. 8. I know what a private window in an Internet browser is. 9. I know what the back and forward buttons in an Internet browser are used for. 10. I know what Internet browser bookmarks used for. 11. I know how to find the security settings on a digital device. 12. I know what things can be bought on the Internet. 13. I can sync information between different devices.	Basic knowledge about technology.
14. I know that there are risks of using technology. 15. I can figure out all of the risks of using technology. 16. There are some dangers to using digital technologies that I cannot predict.	Knows that all technologies entail risk, only some of which can be anticipated.

Table 4.6: Capability sub-construct items and indicators

Capability (22 items)	
Questionnaire item(s)	Indicators
1. I can use a computer mouse. 2. I can use keyboard shortcuts. 3. I can open a private window in an Internet browser. 4. I can use the back and forward buttons in an Internet browser. 5. I can use bookmarks in my Internet browser. 6. I can download files from the Internet. 7. I can sync information between multiple devices 8. I can change security settings on a digital device. 9. I can buy things on the Internet. 10. I can makes changes in files (for example a document, a presentation, a spreadsheet, and a video). 11. I can save files. 12. I can save emails on the Internet. 13. I can fill out forms on the Internet.	Has a range of hands-on abilities.
14. I can figure out what to do if a digital device is frozen 15. I can troubleshoot problems with digital technologies. 16. I can find out what is wrong with my digital technologies when they are not working. 17. I can fix my digital device if it stops working.	Can identify and fix simple technological problems.
18. I can get the information I need to fix basic technological issues. 19. I can get information about technology issues from the Internet. 20. I can get information about technology issues from people I know. 21. I can get information about technology issues from stores. 22. I can get information about technology issues from social media Internet sites.	Can obtain information about technological issues of concern from a variety of sources.

4.3 Social behavioral items

The social behavioral construct of digital literacy is defined in the framework as *behaviors mediated by digital technologies that involve asynchronous or synchronous interactions with one or more persons*. The social behavioral construct has five sub-constructs:

- **Peer relationship behaviors:** Behaviors that increase the probability of successfully establishing and maintaining interpersonal relationship with peers;
- **Self-management behaviors:** Behaviors that reflect the regulation and control of one's own behavior in accordance with external and internal rules;
- **Academic-related behaviors:** Behaviors that increase the probability of success in academic learning;
- **Compliance behaviors:** Behaviors that conform to rules and expectations; and
- **Assertion behaviors:** Behaviors that reflect the ability to appropriately express personal

thoughts, feelings, opinions and rights.

Table 4.7 through Table 4.11 below present the cognitive sub-constructs and the corresponding questionnaire items.

Table 4.7: Peer relationship behaviors sub-construct items and indicators

Social behavioral construct	
Peer relationship behaviors (34 items)	
Questionnaire item(s)	Indicators
1. I share my feelings with people on the Internet. 2. I compliment people online. 3. I use emoticons like clapping hands to tell people online I like something they posted. 4. I use emoticons like smiley faces to tell people online I like something they shared. 5. I use emoticons like thumbs up to cheer people on. 6. I offer help to people on the Internet if I see they need help.	Compliments/praises/applauds peers.
7. I offer help to people on the Internet if I see they need help. 8. I offer help to people on the Internet if they ask. 9. I offer help to people on the Internet if I see they are having problems.	Offers help or assistance to peers when needed.
10. I have conversations with people using digital technologies. 11. I have conversations with people using text messages. 12. I have discussions with people on the Internet.	Participates in discussions, talks with peers for extended periods.
13. I pay attention to the feelings that come through the things people post on the Internet. 14. I change the way I say things on the Internet if I think it will hurt someone's feelings. 15. I apologize if someone says something that I posted on the Internet is offensive. 16. I enjoy it when someone people say something I posted on the Internet is funny. 17. I see how someone is feeling by reading the post they put online. 18. I see how someone is feeling by looking the images they put online. 19. I share my feelings with people using emoticons like smiley faces. 20. I am sad when someone shares something sad online. 21. I am happy when someone shares something happy online.	Is sensitive to feelings of peers (empathy, sympathy).
22. I communicate with people I know using digital technologies. 23. I share things I find on the Internet with people on the Internet. 24. When I am looking for someone the first thing I do is send them a message.	Regularly communicates on the Internet with peers.

25. I have many friends on the Internet. 26. It is easy for me to make friends on the Internet. 27. I know how to make friends on the Internet.	Makes friends easily, has many friends.
28. I send chat invitations to people I want to talk with. 29. I send invitations to people I want to play games with. 30. I send chat invitations to people with similar interests as me. 31. I invite people to make comments on things I put on the Internet.	Invites peers to play/interact.
32. I can find people I know by searching the Internet. 33. I can search the Internet to find people who have interests similar to mine. 34. I can use digital technologies to invite people to do things with me.	Skillfully initiates or joins conversations with peers.

Table 4.8: Self-management behaviors sub-construct items and indicators

Self-management behaviors (12 items)	
Questionnaire item(s)	Indicators
1. If someone teases me on the Internet, I ignore the person. 2. If someone teases me on the Internet, I let it go. 3. If someone teases me on the Internet, I let the website owners know. 4. If someone teases me on the Internet, I tease them back.	Responds to teasing by ignoring peers, responds appropriately to teasing.
5. When people criticize me on the Internet, I try to understand their point of view. 6. When people criticize me on the Internet I try to use their comments to improve myself. 7. When people criticize me on the Internet, I block them from seeing my stuff. 8. When people criticize me on the Internet, I criticize them back.	Receives criticism well, accept criticism from others.
9. I remain calm when I read something on the Internet that makes me angry. 10. I remain calm when someone sends me something on the Internet that makes me angry. 11. I remain calm when people do something on the Internet that makes me angry. 12. I remain calm when people intentionally do something on the Internet to make me angry.	Remains calm when problems arise, controls temper when angry.

Table 4.9: Academic behaviors sub-construct items and indicators

Academic behaviors (11 items)	
Questionnaire item(s)	Indicators
1. I can study different topics on the Internet by myself. 2. I can finish tasks on time on the Internet by myself. 3. I can finish things on the Internet by myself	Accomplishes tasks/assignments independently, displays independent study skills.

without help from other people.	
4. I ask for help on the Internet when I am having trouble doing something. 5. I look for the help button on when I am having problems doing something on the Internet. 6. I send emails to get help when I am having problems doing something on the Internet. 7. I ask for help on the Internet when I am having trouble doing something.	Appropriately asks for assistance as needed, asks questions.
8. I respond to non-emergency alerts and notifications on digital devices when I have something to do. 9. I respond to emails when I am working on something. 10. I respond to popups that open when I am working on something. 11. I focus on tasks while receiving unrelated online notifications.	Ignores peer distractions while working, functions well despite distractions.

Table 4.10: Compliance behaviors sub-construct items and indicators

Compliance Skills (3 items)	
Questionnaire item(s)	Indicators
1. I follow the rules for the websites I visit. 2. I understand the rules for different Internet websites. 3. If the owners of a website asks me not to do something, I will not do it.	Follows rules about digital technologies.

Table 4.11: Assertion behaviors sub-construct items and indicators

Assertion behaviors (6 items)	
Questionnaire item(s)	Indicators
1. I express my feelings when people offend me on the Internet. 2. I express my feelings to people on the Internet when they do stuff to offend me.	Expresses feelings when wronged.
3. I join groups on the Internet. 4. I join conversations on the Internet. 5. I join groups on social media Internet sites. 6. I join conversations on social media Internet sites.	Appropriately joins ongoing activity/group.

Affective items

The affective construct of digital literacy is defined in the framework as emotions or feeling about digital technologies and carrying out different activities using digital technologies.

Table 4.12 presents the cognitive sub-constructs and the corresponding questionnaire items. As described in the previous chapter, the affective construct in the everyday digital literacy framework does not have any indicators attached to it. The presence of any feeling, as represented in the questionnaire, is an indication of an affective state.

Table 4.12: Affective construct items and indicators

Affective construct	
Questionnaire item(s)	Related construct
1. How do you feel about your ability to use digital devices to remember things? 2. How do you feel about your ability to search for information on the Internet 3. How do you feel about your ability to choose a trustworthy website for information?	Cognitive
1. How do you feel about finding files on a digital device? 2. How do you feel about adjusting the security settings on a digital device? 3. How do you feel about completing forms on the Internet?	Technological
1. How do you feel about participating in discussions on the Internet? 2. How do you feel about obeying the rules of a website? 3. How do you feel about sharing information with people on the Internet?	Social behavioral

Scaling

Many scales exist for measuring the presence of a phenomenon. The sort of scale one uses influences the data—ordinal, interval, ratio—collected and the analysis done. This is important because the descriptive and inferential statistics procedures differ for ordinal, interval and ratio level variables. Using an inappropriate statistical procedure increases the chances of reaching the wrong conclusions about research (Jamieson, 2004). The fact that there is disagreement on whether or not some scales are ordinal or interval (Grace-Martin, 2008; ResearchGate, 2014) complicates this. For example, some researchers label Likert scales as interval measures, others label them ordinal measures, and others analyze them as interval without stating a position. Some researchers suggests that Likert scales are ordinal because the response categories have a rank order and as such should use non-parametric statistical procedures (Jamieson, 2004). However, there is research that suggests that if a researcher is trying to determine whether to use Likert scale data as interval level measures, they should look at the distribution of the responses (normal distribution) and the sample size to determine whether to use parametric tests. Others posit that Likert scales are in fact interval-level the intervals between the points are frequently assumed to be equal.

Although I agree that Likert scales can be estimated to provide interval level measures (Carifio & Perla, 2007) and be analyzed accordingly, there are other challenges to Likert scales. I use alternative measurement scales to mitigate those challenges. I use phrase completion measurement scales for items in the cognitive, technological, and social behavioral constructs. I use a semantic differential measurement scale for items in the affective construct. The two share similar qualities. Both use integers, which are by definition equal distance apart and not verbal labels on their own. Both also make use of opposing phrases at each end of the scale.

Introduced in 2003 by David Hodge and David Gillespie to address the weaknesses of Likert scales, phrase completion scales are a relatively new approach. Phrase completion scales are unidimensional measures that provide interval level data (Hodge & Gillespie, 2003). The phrase introduces part of a concept that is completed by selecting a response on the scale. The phrase completion approach does not typically use negatively worded items or midpoint responses. There are eleven points, two ends. The

left endpoint represents zero indicates the absolute absence of the construct and the right endpoint represents ten and indicates the maximum amount of a construct. The two endpoints are anchored with opposing responses that can be used to complete the phrase. There are typically no labels other than the two endpoints because that could interrupt the scales interval nature (Leung, 2011, p. 414). Take for example, the questionnaire item "I know what things computers and laptops are good at doing." Using the phase completion approach, I present the item along with a ten-point scale that possess two attributes, phrase completers, anchored at each end of the scale. Questionnaire takers would choose a location on the scale that best represents their response. The endpoints represent extreme values, while the point marked with the number five is a medium or moderate amount of the attribute. The Participants to choose from to complete the phrase.

Table 4.13: Technological construct questionnaire item

	Not at all								Definitely		
	0	1	2	3	4	5	6	7	8	9	**10**
I know what things computers and laptops are good at doing											

Although not very common in the information science literature, phrase completion scales researchers in other disciplines use them. For example, Bunger used the approach to study competition and perceived trustworthiness among children's behavioral health organization staff (Bunger, 2013). Research in other disciplines comparing Likert scale and phrase completion show that phrase completion performs better than Likert scales (Peterson, Gilmore Powell, Hamme Peterson, & Reid, 2017, pp. 58-59).

I use semantic differential scales to measure the presence of affective states. Semantic differential scales are bipolar multidimensional scales that provide interval level data (Schriesheim & Klich, 1991). Researchers introduced semantic differential scales as a way to measure and analyze ones feelings. Semantic differential scales can measure directionality and intensity of a response. Usually, individuals' receive a phrase that corresponds with a phenomenon of interest. Then individuals' select a response on the semantic differently scale that represents their feeling about the statement. There are two ends. The left and right endpoints holds adjectives that bipolar (Summers, 1970, p. 235). There is typically seven points on the scale. Each point in the scale represents an integer value that follows the directionality of the adjectives. For example, -3, -2, -1, 0, 1, 2, 3 might represent the points from bad to good. Take for example, the questionnaire item. I present the item with a seven-point scale that possesses opposite feelings on each end. The center is marked with the number 0 that indicates the lack of presence of either of the feeling. Moving from there 1, 2, and 3, represents slightly, quite and extremely respectively.

Table 4.14: Affective construct questionnaire item

	Confused									Not confused	
	-1	-2	-3	-4	-5	0	1	2	3	4	**5**
How do you feel about your ability to use digital devices to remember things?											

Semantic differential scales have several strengths. Unlike Likert scales, they are able to quantify more than the agreement with a question because they measure directionality (for example (happy versus

sad) and intensity (for example slight through extreme) of a response. Next, semantic scales do not require researchers to present a question that conveys some sort of judgement. The semantic scales approach only requires the researcher to ask the question and provide contrasting adjectives at each end of the scale (Duczeminski, 2017; Lehman, 2012; Summers, 1970, p. 235). In addition, as with Likert scales, you can still find out about the intensity with which one holds a feeling or opinion by employing values between choices. Finally, semantic differential scales are most appropriate for questions aimed at capturing affective dispositions. Semantic differentials also have some weaknesses. For example, they do not transfer well from one language to another. Next, the values used in questionnaires that use semantic differential scales are contextual. Specifically, the polar opposite pairs may not move well across contexts. An example of this is the bipolar pair, terrible/delighted (Verhagen, van den Hooff, & Meents, 2015). "Delighted" may be appropriate to represent the feelings related to online clothes shopping experience, but it seems less so for the things like scheduling an appointment with a doctor or making funeral arrangements.

I used the affective states described in chapter three as my starting point. Next, I identified the bipolar opposites of each, taking into account the feelings that questionnaire items were asking people report. To help me identify the most appropriate opposite I used online tools, namely the Opposite Dictionary (Opposite dictionary, 2018) and Thesaurus.com (Dictionary.com, 2018). For consistency, I will be using an eleven-point scale here instead of the seven-point scale typically used with semantic differential scales. This decision is also support by research comparing 5, 7 and 11-point scales that has demonstrated that 11-point scales are closer to interval level of scaling and normality (Leung, 2011, p. 418). The larger scale also provides more precision and strengthens the researcher's ability to explain a point of view (Wittink & Bayer, 2003, p. 16). The drawback to using the larger scale is that it takes more time to complete.

4.4 Conceptual validation: Card sorting

Card sorting

Card sorting is a method used to validate frameworks and questionnaires. The card sorting method comes out of psychology and is a way to study how individuals organize and categorize a collection of related objects or terms into different groups on based on their 'similarity,' 'relatedness,' or 'co-occurrence.' (Slaney & MacKinnon-Slaney, 2000; Whaley & Longoria, 2009). Tyler introduced the card sort process in 1961 and since then, the process has be expanded on by several (Davis Jr., 1989; Dewey, 1974; Dolliver, 1967; Moore & Benbasat, 1991; Tyler, 1961; Williams, 1978). Tyler's initial use consisted of asking participants to sort a set of one hundred cards with occupation names into three groups, "would not choose", "would choose" or "no opinion." Dolliver expanded the card sort process by asking participants to rank ordered their choices (Dolliver, 1967). Later scholars and practitioners have made modifications to the sorting process or content of the cards since then, but the foundation remains the same. For example, in Fred Davis Jr.'s research on information systems, individuals were asked to put "13 cards into three to five categories so that the statements within a category were most similar in meaning to each other and dissimilar in meaning from those in other categories" (Davis Jr., 1989, p. 325).

There are two types of card sorts, open or free card sorting and closed sorting. In open card sorts, individuals receive a set of unordered items and group the items in a way where all of the similar items are together. They can create as many groups as they wish. They then assign a category to each group.

An open card sort is appropriate when researchers want to understand how individuals' group items and the category labels they assign to each group. In a closed card sort, individuals receive a set of unordered items and a list of categories to organize the items under. Individuals place each card under one of the predefined categories. On some occasions, researchers present individuals with a category labeled, "not sure/not available" category label to prevent individuals from forcing cards into categories. A closed card sort is appropriate when a researcher is working with a pre-defined set of categories, and wants to learn how individuals sort content items into each category. In this research, I use a closed card sorting method.

The objective of the card sort method is to enhance content validity by identifying items that may be ambiguous or inappropriately worded. Individuals sort the set of items into one of 12 groups associated with each construct. I compare their sort to my conceptual representation of everyday digital literacy. When the individuals' understanding of the concepts as represented through their sorted piles misalign with my representation I reworded or remove cards from future sorts. Next, a new individual sorts the cards. I follow this iterative process until I reach a satisfactory level of agreement. Agreement in the card sorting method means individuals placed items in their intended construct.

Card sorting participants & sampling

I use a purposeful sampling method for the card sorting activity. The technique I use is the expert sampling method. The expert sampling method gathers insights from individuals with particular expertise. For this research, I include information science professionals like librarians and project managers. They are included to increase the likelihood that I conceptual representation of digital literacy is accurate and holistic. I recruit participants in person and by email. The documents used to recruit participants are in Appendix A.

Card sorting administration

To begin the card sorting task, individuals walk through a practice round with unrelated cards (see Appendix B: Card sort instructions) with the facilitator. During the card sorting activity, individuals receive two sets of unsorted index cards. Each card in one of the sets is labeled with one of the everyday digital literacy framework construct and sub-construct category names. The number of cards with construct category names correspond with the number of framework constructs. Each card in the second set of cards has a statement on one side. These statements represent the items in the everyday digital literacy self-report questionnaire. Individuals read the statement on each index card and group the index cards into 12 groups, matching the framework sub-constructs. Next, individuals state a definition for each of the groups they create. Individuals are also encouraged to make comments about how they group the index cards. After the index card sort activity is complete, I record the which categories the index cards put into. When possible, I also take photographs of the sorting results. I enter the data into an Excel workbook for analysis.

Card sorting data analysis

Moore and Benbasat's "Hit Ratio" method (Moore & Benbasat, 1991) is used to analyze data collected using the card sorting method. The Hit Ratio method is a qualitative analysis method that requires researchers to analyze how often judges place items within the intended construct (Nahm, Rao, Solis-Galvan, & Ragu-Nathan, 2002). The higher the percentage of items placed in the target construct, the

higher the degree of agreement across different judges. Questionnaire items constructed from categories that have a high degree of correct placement of items within them are declared to have a high degree of construct validity and likely to have good reliability scores (2002, p. 115).

There are no guidelines for assessing good levels of placement, but the theoretical vs. actual matrix developed using this method can be helpful in understanding problem areas. As an example, imagine that I have created five question items for each of three theoretical constructs. With a panel of four participants, there theoretically can only be 20 placements in each construct (5 items x 4 participants). After participants have completed their card sorts, a matrix of item placements visually shows the spread (see Table 4.15).

Table 4.15: Example hit ratio

	Actual						
		C1	**C2**	**C3**		**Total**	**% of Hits**
Theoretical	**C1**	17	1	2		20	85
	C2	3	15	2		20	75
	C3	1	1	18		20	90

Upon inspecting the diagonal of the matrix, one can determine the overall hit ratio and how the individual items are classified. In this case, 50 'hits' were achieved, giving us an overall hit ratio of 83% (50*100%)/60). For example, row C2 shows that only 75% (15/20) are within the intended construct. This means that the items from C2 classified outside the construct were not different enough from items in the other two constructs. All items that are consistently classified outside of the intended construct should be examined and either revised or considered for removal.

4.5 Focus groups

Focus group method

The focus group method is a highly valued and widely used qualitative research method that involves open-ended interviews with up to ten people on specific topics or issues (Dilshad & Latif, 2013; Jobe, 2003). Survey and questionnaire development experts and scholars often use focus groups interviews to surface problem questions in a questionnaire. The focus group method involves bringing people with similar backgrounds and experiences together to participate in a semi-structured interview. A strength of focus groups is that they are open ended and less structured than other interview formats. The group setting can help elicit a greater range of responses. Data collection in focus group interviews is cost-effective because you are able to collect feedback from several people at once (Krueger & Casey, 1994). Finally, focus groups are typically less stressful and more enjoyable for participants because facilitators create an environment that places attention on understanding the comments and thought processes of participants and away from a search for a single right answer (Krueger & Casey, 1994, pp. 5-8).

There are limitations to the focus group method as well. For example, you cannot ask as many questions as you can in a one-on-one interview, and the time a participant has to respond can be limited because others might want to speak. The person leading the focus group session has to juggle several tasks, namely, asking interview questions and moderating the discussion so that all participants have an opportunity to express their viewpoints. Next, focus groups are more open ended and less structured. The quality of a focus group relies heavily on the facilitator's ability to moderate the discussion. Despite the limitations of focus groups, they are a very useful method for soliciting feedback. The feedback is

usually more pointed and animated than what is gathered using other methods (Morgan, 1996, pp. 13-15).

The objective of focus group interviews in my research is to examine how clear the questionnaire items are, the usefulness of the instructions, and the understandability of the scales (Willimack, Lyberg, Martin, Japec, & Whitridge, 2004, p. 396). All of the focus groups steps described in this chapter follow recommendations made in Fowler (Fowler, 1995). Focus groups consist of between three to nine individuals (Indiana University Center for Postsecondary Research, 2010, p. 8). I conduct three focus groups, each with between three and five formerly incarcerated individuals. In general, focus group interviews last between one and two hours, depending on the complexity of the subject of interest, the number of questions and the number of participants. Individuals plan to spend up to two hours in the focus group sessions.

Focus group participants & sampling

Nationally, over 650,000 individuals every year (Department of Justice) and return to the community. There are over 16,000 people over the age of 18, ninety-two percent of whom are men, incarcerated in one of the Washington State Corrections' 12 prisons. In the early 2000's an average of 8,000 individuals were released by the Washington State Department of Corrections from prison every year (Durose, Cooper, & Snyder, 2014; Washington State Department of Corrections, 2013). That number has increased almost three-fold. In both 2014 and 2015, the number of individuals that returned to the community was over 20,000 (Carson & Anderson, 2016, p. 12).

Every year, approximately 1,500 individuals release into King County (Rowe, 2016, p. 3). They must reestablish their lives. This can be difficult with and without support. Some individuals returning from prison get assistance from family and friends. Many others get assistant from agencies that help individuals transitioning back into the community. Several organizations in King County serve formerly incarcerated individuals. These organizations play an important role in supporting formerly incarcerated individuals. The organizations I contact are in Table 4.16. I send emails describing the research I am doing and ask the agencies to share it with clients and staff. I also post flyers at approved places at the agencies.

Table 4.16: King County agencies serving the formerly incarcerated

- AARP Foundation WorkSearch: They offer free employment and training services to workers 55 years old and over who have been incarcerated.
- Black Prisoners Caucus
- Compass Cascade
- House of Mercy
- Fare Start
- Fight WA
- King County Diversion and Reentry Services
- Millionaire Club
- Northwest Justice Project
- Pioneer Human Services: They have a class for previously incarcerated men and women that works on basic life skills, resume building, accessing services, etc.
- Post-Prison Education Program
- Transformative Education Beyond Bars
- Solid Ground

- Sound Mental Health: They provide help to previously incarcerated men and women in their search for employment and help them overcome homelessness.
- University Behind Bars
- Urban League of Metropolitan Seattle
- Washington State Association of Oxford Houses

I work with the organizations to recruit individuals to participate in focus group interview sessions and administer the questionnaires. Individuals are recruited though an invitation that will be posted online (see Appendix D: Focus group recruitment email) and printed and posted in physical locations (see Appendix C: Focus group recruitment flyer/posting). I use a non-probability, purposeful sampling method because it is the most effective way to identify the population of interest. People who have spent time in prison as well as those that have not are included in the focus groups. The sampling frame includes all individuals who have been ever been incarcerated, who work with incarcerated people or who have someone close to them who is or has ever been incarcerated.

Focus group administration

I administer all of the focus group interviews (see Appendix E: Focus group interview guide). Interviews start by having each individual complete a questionnaire (See Appendix H: Everyday digital literacy questionnaire booklet). Individuals are encouraged to make notes, comments and questions in the margins—about any aspect of the questionnaire—that they have while completing the questionnaire. Once all of the individuals complete the questionnaire, we gather into a group and discuss the experience of completing the self-report questionnaire.

The discussion begins by getting individuals' general impressions about the self-report questionnaire. I ask questions such as, "How easy or hard was it to fill out the questionnaire?" We start by discussing general impressions of the questionnaire: Then I ask more focused questions about the self-report questionnaire. For example, I ask participants to explain what "digital technologies" means according to their understanding, and ask individuals to define other terms used in the self-report questionnaire. Individuals are encouraged to describe what they were thinking while making their choices and to describe their thought process. Appendix E: Focus group interview guide shows the sorts of questions I pose during focus group interviews.

People who use the focus group method recommend having at least two interviewers during focus group interviews, one person focusing on moderating the discussion and the other person focusing on everything else—notetaking, making sure recorder is recording and that everyone has signed in, etc. Unable to identify a co-interviewer, took other steps to compensate. I print color coded forms (e.g. sign in form in green). I arrive at the focus group location early so I can set up the room and voice recording device. Following the focus group interviews, I scribe notes and collect participants' papers with their notes. The data gathered at the focus group session help refine the questionnaire.

Focus group interview data analysis

The data from each focus group interview goes through a content analysis process described later in this section. To manage the information collected and minimize the introduction of bias during the analysis process, the analysis of focus group data should be systematic, sequential, verifiable and continuous (Rabiee, 2004, p. 657). In this research, the interviews I transcribe audio recordings, individual interviewee written responses in the self-report questionnaire booklet and notes, and researcher field

notes. Before analyzing a transcript, I read written responses and comments in the self-report questionnaire, and read my field notes (Garcia, 2011, p. 4). Then I read the transcript and isolate the questions or statements from the focus group interviews that contain or identify at least one problem (DeWalt, Stone, Hahn, DeVellis, & Castel, 2008, p. 32). During the analysis process, I review each questionnaire item identified as a problem and resolve the problems identified.

Between the second and third focus group interviews I consult with two research scientists. During the consultation session, I explain the purpose of the research and explain how the focus group sessions were structured. Next, the research scientist reads through the questionnaire and provides feedback about aspects of the questionnaire that can be improved. I then present to them the feedback from the focus group participants and solutions that I am considering. The research scientist provides their evaluation of my solution and makes additional suggestions when necessary.

4.6 Piloting EDL questionnaire

In this research, I use a purposeful sampling technique to further measure the validity of the questionnaire, gather, and analyze data on digital literacy levels of formerly incarcerated individuals. I use field testing protocols and techniques as a way to structure and guide the activities in this portion of the research because they provide clear instructions on how to proceed through the steps. Field tests are studies where the research instruments—questionnaire and administration procedures—are conducted with segment of the target population. In a field test, a questionnaire and the administration procedures are evaluated. Field tests are used any time after a prototype of a questionnaire exists. Field tests serve as an opportunity to collect high-quality data sets that can be analyzed using standard statistical testing methods (NAEP, 2011) and used to learn about a target population as it relates to the phenomena of interest.

Field tests are important because they allow researchers to identify sources of measurement errors that may go unnoticed during earlier steps. Measurement error is the extent to which research findings differs from its "true" value due to imperfections in the way the data is collected. There are two types of measurement errors—random and systematic. Random errors are random and uncontrollable and appear in all measurement. Random errors threaten the reliability of an instrument. A measurement instrument affected by random error will produce results that are sometimes higher or lower than the actual magnitude of the item measured. Take for example the question, "how many smartphones do you own?" If a participant intended to say one, but mistakenly says two even though they only own one it would be a random.

Systematic errors arise from the measurement instrument, process, or subject. Systematic errors threaten the validity—the degree that it measures what it intends to measure—of an instrument (Waltz, Strickland, & Lenz, 1991, pp. 86-86). Take for example the question, "how many smartphones do you have?" If the question intended to measure the number of smartphones they "owned" then the question would produce systematic errors because it was worded to find out how many they may "have" and not how many they owned. The data collected through administering the questionnaire can help identify the presence and impact of both sources of measurement errors.

There are limitations to administering questionnaires. The most significant of these is that they can sometimes lead researchers to make inaccurate predictions or assumptions phenomena topic of study, particularly if the sample size is smaller than one might find in larger studies (Leon, Davis, & Kraemer,

2011). For example, if most of the individuals that participate in my research provide responses that to portray a view of themselves competent with digital technologies even though they are not, then I would arrive at a different conclusion then if they had provided the response that better reflect their fluency with digital technologies. (Waltz, Strickland, & Lenz, 1991, pp. 428-429). People may provide these sorts of misleading responses because they believe answering in a way that better captures their level of competency with digital technologies is not socially desirable.

Participants and sampling

Data collection will serve two function. One function is to assess the reliability, convergent validity, discriminant validity, and factorial validity of the self-report questionnaire items that were refined in the card sorts and the focus group interview sessions (Davis Jr., 1989, p. 326). The other function is to help me understand the digital literacy level of formerly incarcerated people. I recruit individuals to complete the questionnaire through email invitations and flyers. The agencies that I recruit from are listed in Table 4.16. During the administration of the questionnaire, individuals are reminded that participation is voluntary, that they can take as long as they want to complete the questionnaire, and that they can stop at any time.

I administer the questionnaire to 36 individuals. I recruit participants from the organizations mentioned in Table 4.16. The documents I use to facilitate this process are Appendix F: Questionnaire recruitment flyer and Appendix G: Questionnaire recruitment email. I use a non-probability, purposeful sampling method to seek out participants. A purposeful sample is different from other non-probability sampling method. This method relies on the judgement of the researcher. The primary goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best align you to answer your research questions (Lund Research Ltd, 2012). This is different from a convenience sample (another non-probability sampling method) in that ease of access drives researchers to use a particular population (e.g. students in a university class) (Trochim, 2006). Using this method is likely to reduce an coverage errors that may have been introduced if I were to do a random sample (Groves, et al., 2009, p. 49) The sampling frame include all individuals released from prison in the last sixty days.

4.7 Questionnaire administration

Researchers administer questionnaires in different ways. They administer them in person via paper and pencil interview, using a computer, or using face-to-face verbal interviews between individuals and a researcher. They administer questionnaires remotely via mail, computer, or telephone interview between individuals and a surveyor. The sort of questionnaire I am using is a self-report questionnaire. This means individuals report on themselves. The questionnaire is self-administered. Thus, they complete the questionnaire without the assistance of a third party. Individuals complete a paper questionnaire (see Appendix H: Everyday digital literacy questionnaire booklet) using a pencil. The researcher will be present to answer process questions if needed. The booklet starts with the everyday digital literacy self-report question item and ends with a set of demographic questions.

The demographic section includes questions about digital technology access and use. Participants provide information about: (a) their access and use of digital technologies prior to incarceration (b) their access and use of digital technologies while incarcerated (c) their access and use of digital technologies since reentering the community (see Appendix I: Demographic items in questionnaire). Individuals

receive honorarium for $25.00 after returning their booklet. The $25.00 is a small token of appreciation for their participation.

Data analysis

Several activities take place after each data collection session. One activity is coding, translating the nonnumeric information into numeric data. For example, each value on the Likert scale responses "'strongly agree', 'agree', 'neutral', 'disagree', 'strongly agree'" a distinct numerical value, for example 1 = strongly agree and two = agree. Codes help researches conduct analyses (Groves, et al., 2009, p. 331).

Before performing statistical analysis on questionnaires submitted, the data is cleaned—inspected and edited as necessary. Inspection consists of skimming through submitted questionnaires and looking for things that need special attention or make parts of the questionnaire unusable for my research. Editing entails inspecting and changing the data collected. The amount of editing that occurs depends on how much factual data is collected (Groves, et al., 2009, pp. 346-347). The section that requires the greatest amount of factual data is the demographics section. For example, age, amount of time incarcerated, and education level. The types of edits I focus on are balance edits and consistency edits. All potential edits are scrutinized prior to carrying them out and documented if applied (Groves, et al., 2009, p. 346).

Another activity that occurs after data collection is imputation, dealing with items that are missing responses in the questionnaire (Groves, et al., 2009, p. 356). One method for dealing with missing responses is to remove questionnaires that have items with no responses from the dataset. An advantage of this method is that you only analyze what individuals themselves have provided. A disadvantage that it can lead to underestimation or overestimation of a phenomena. Another method is to add estimated answers into a field of a data record that was missing data or had incorrect or implausible data. An advantage of the latter approach is that you would consistently be working with the same number of records. When working with hard to reach communities this is extremely important. A drawback to this method is that some researchers' view this is as made up information, and are not comfortable with this approach. However, there are several credible methods for adding missing data when the people who completed it are not available to provide it. If I decide to use one of these approaches, I will investigate further (Groves, et al., 2009, pp. 355-359).

In the research, I analyze the data collected by computing the descriptive statistics used to explain and analyze survey data (Groves, et al., 2009, p. 49). This includes very simple statistics like the sample mean and population totals.

4.8 Summary

Frameworks of digital literacy have changed over time to represent the increasing complexity of what it means to be digitally literate. They have become progressively intricate because of the increasing complexity of the digital environment. However, the frameworks reviewed are not fully holistic, including a cognitive, technological, social behavioral and affective construct. The first research activity described in this chapter, closed card sorts, aims to verify that my synthesis and holistic representation of everyday digital literacy captures the aspects desperately represented in the literature and in practice. Participants go through a collection of index cards that have statement written on them and group the cards under the construct that they feel it best fits with. This research activity contributes to the validity of the framework put forth in this research.

The next research activity, focus groups, brings together a diverse group of individuals that are all connected, through either life experience, employment, or some other means to incarceration. These individuals complete the everyday digital literacy questionnaire and provided feedback on its ease of completion. The feedback provided by focus group participants' increase the likelihood that individuals that complete the questionnaire can read and understand questionnaire instructions and items with minimum difficulty.

There are several ways to measure everyday digital literacy levels. I use a self-report, self-administered questionnaire to accomplish this. The data collected through the questionnaire provides unique and unknown insights about the everyday digital literacy levels of formerly incarcerated people.

In summary, the chapter discusses the methods—card sort, focus group interviews, and administration of the questionnaire—in this research to refine and validate the framework, and collect and analyze data.

5 Results and analysis

The purpose of this research is to:

1. create a unique *Everyday Digital Literacy* (EDL) framework based on an exploration of pertinent literature;
2. create and validate a self-assessment questionnaire based on the constructs and sub-constructs comprising the *EDL* framework; and
3. measure the everyday digital literacy levels of formerly incarcerated individuals using the self-assessment questionnaire.

This chapter reports the research results related to the second and third purposes of the study. An analysis of the findings follows.

The research reported here was completed in four parts:

1. a series of card sorts to validate the EDL constructs and sub-constructs grounding the self-assessment questionnaire;
2. three focus group sessions, and two one-on-one consultation sessions with experts to finalize the self-assessment questionnaire's items, structure and order;
3. data collection based on participants responses to the finalized, fielded self-assessment questionnaire;
4. data analysis.

Each of the four parts is discussed throughout the remainder of the chapter.

5.1 Closed card sorts

Initially, a series of closed card sorts based on the four primary constructs (technological, *Cognitive*, *Social behavioral*, and affective) and the [2]eight sub-constructs of the EDL framework were conducted to establish construct validity.

Preliminary closed card sorts based on the four primary and the sub-constructs of the EDL framework were conducted to establish construct validity.

Five participants were tasked with sorting 169 card items total into 12 categories representing:

- each of the four primary constructs and
- each of the 11 sub-constructs associated with the technological (four sub-constructs), *Cognitive* (two sub-constructs), and *Social behavioral* (five sub-constructs) constructs. The affective construct did not have sub-constructs.

I discovered early on that the method of closed card sorts applied to 169 card items and 12 categories had limitations. Participants had to read the 12 labels and create a working definition for each in their heads. Then, as they read the phrasing of item represented on the card, they had to look back through all 12 labels; recall its working definition, compare the latter to the item as represented on the card and decide under which of the 12 labels to place it. If unsure, participants could set the card aside for the time being. In any case, participants had to move to the next card to fully complete the sort. The pressure on participants to finish the sort on time could result in incorrect placement of the card item.

Many were exhausted after only 30 minutes. My observations during the first five card sorts as well as a review of the audio recordings revealed that the high cognitive load associated with the card sort had hindered participants from finishing. On two occasions participants were not able to complete the card sort in its entirety because the allotted 90-minute time period had expired. Two other card sorts went on for 120 minutes. In both, participants became increasingly anxious and began to skim the cards, instead of reading them. Participants became less thoughtful as the sort progressed. Inattentive placement of the card items could compromise the reliability of results.

Consultation with researchers, dissertation co-chairs, and a writing editor who had participated in the analysis of the initial data collection helped me to modify the card sort. During brainstorming sessions with two experts in the card sorting method, I described the hurdle I had encountered, and was encouraged to find a way to decrease the number of cards items that participants needed to sort. The dissertation co-chairs agreed that sorting 169 cards into 12 categories would heighten the cognitive load demanded of participants, potentially undermining the reliability of results.

In a conversation with my writing editor, I realized participants were not provided with enough information to guarantee correct card item placement. Participants were ignorant of the relationship between the 12 sub-construct category labels and the four primary constructs comprising the *EDL*. It was unknown whether if after having sorted the cards into the initial 11 sub-constructs and one construct participants had been shown three additional primary construct categories representing the technological, *Cognitive*, and *Social behavioral* constructs of the framework would the percentage of placed correctly items have increased.

After having identified two significant flaws in the data collection design, I changed the way in which the initial card sort was conducted. Rather than having participants sort both constructs and sub-constructs in the same card sort, I decided to conduct a series of independent closed card sorts; one focused on only primary constructs, and the other focused only on sub-constructs. The change was designed to reduce participants' fatigue and provide them with a more complete representation of the *EDL* framework so as increase the likelihood that construct validity was not the product of chance.

Primary construct card sorts

In order to substantiate construct validity, the primary construct card sorts were conducted in a series of two rounds. This design choice allows for interpretable comparison of card item placement performances across rounds to thus build an informed consensus around construct validity.

In each round of card sorts, five different participants sorted 169 items total into four categories, each representative of one the four primary constructs of the EDL framework: *Technological*, *Cognitive*, *Social behavioral*, and affective. I conducted the card sorts with more items than could reasonably be used in the finalized questionnaire. Confident that some items would be removed, I set the hit rate ratio threshold for retention relatively high, at 75% of participants.

In Round 1 of the primary construct card sorts, the outcomes for each item were decided according to card placement performance measures: items were flagged for retention if placed correctly by at least 75% of participants; for modification if by at least 60%; and, for removal if by 40% or fewer.

Before finalizing the decision to remove an item, I looked at whether re-phrasing it could lead to higher rates of correct item placement. For example, in Round 1 of the primary construct card sort, all

participants noted that the phrase *asking others* led them to place the item *I ask others about the risks of using digital technologies* (item #54) into the *Social behavioral* primary construct. Having intended participants to place the item in the *Cognitive* primary construct, I modified the item to read, *there are risks to using digital technologies;* thus, emphasizing the relationship between deliberative thinking and evaluative judgment. Similarly, the item, *I can get information about technology issues from people I know* (item #133) was placed in the *Social behavioral* primary construct based on the ambiguous use of the phrase *from people I know*. Participants interpreted the relationship as being one of familiarity rather than knowledge acquisition. I modified the item to read *I can get information about technology issues from people*; thus, relying on the generic use of the word "people" to clarify the "knowing" relationship as being one of cognition.

Conversely, several participants placed the item, *I have heard about the Internet* into the *Cognitive* construct, noting that the phrase "have heard about" implied ones having had reached conclusion using a series of cognitive processes. However, I had intended the card item to be placed in the technological construct category. Consequently, I modified the item to read *The Internet exists*.

There were several instances in which I was unsure how to modify the phrase on a card without obfuscating the correct placement of the item in the intended primary construct. In these situations, I retained the item until the second round without making modifications. For example, the card item *I can study different topics on the Internet by myself* (item #54) was intended for placement in the *Social behavioral* construct. It was placed correctly by only 20% of participants. Several participants placed the item into the *Cognitive* primary construct, noting that the phrase omitted mention interaction with others. After considering several modifications of the phrase including, *I can study different topics on the Internet without the help of other people*, *I can study different topics on the Internet alone*, and "*Studying different topics on the Internet by myself*" I decided against making any modification. Instead, I flagged the item for possible removal depending on the percentage of participants' correct placement of the item in Round 2 of the primary construct card sort.

I then recruited five new participants and repeated the process. In Round 2, the 169 items total reflected the modifications of phrasing subsequent the evaluation of Round 1 of the primary construct card sorts results.

After having evaluated the results of Round 2, I finalized the decision whether to remove an item. There were several reasons an item could be removed:

1) it was placed correctly by only 40% or less of participants. Items falling into this construct were often removed without any deliberation.

2) it performed poorly in at least half of the rounds.

3) it was placed correctly by between 40% and 50% of participants. In these cases, research artifacts—the notes available, my memory, and audio recordings—were used to make a final decision. If the information captured in these research artifacts was convincing, I would remove an item.

I decided something was convincing for either of two reasons:

1. several participants articulated the same point or,

2. if, after considering the participants point-of-view, I was less certain about my initial conclusion, based on a literature review, that an item should remain in the intended construct.

After having conducted Rounds 1 and 2 of the primary construct card sorts, an analysis of the placement of the items, notes taken, and transcriptions of audio recordings was conducted in order to finalize the number of items assigned to each of four primary constructs comprising the *Everyday Digital Literacy* framework: (1) *Technological*, (2) *Cognitive*, (3) Social behavioral, and (4) *Affective*. In the next section, the results from Rounds 1 and 2 of the primary constructs' card sorts will be reported.

Primary constructs' card sort results

Technological construct results

In Round 1 of the *Technology construct* card sorts of the 55 total items over 42 items (over 75%) were placed correctly by at least 80% of participants. See Table 5.1. Thirteen items (24%) were place correctly by 60% or fewer of participants.

Of the 42 items that were placed correctly by at least 80% of participants in Round 1, two items (a) *I use digital technologies to remind me of important events* (item #148) and (b) *I can get information about technology issues from the Internet* (item #100) were placed correctly by 60% of participants in Round 2 of the card sort. I decided to remove item #148. I felt that enough items similar in content, for example, *I use digital technologies to remind me to do things* (item #152), and *I use digital technologies to remember birthdates* (item #90), were placed correctly in the *Technological* construct by at least 80% of participants in Round 2 to justify its removal. There being no other item in the *Technological* construct similar in content to item #100, the latter item was retained.

Of the 13 items placed correctly by 60% or less of participants in Round 1, two items (a) *I have heard about smartphones* (item #113) and (b) *I can get the information I need to fix basic technological issues* (item #90) were placed correctly by at least 80% of participants in Round 2. The two items were retained. Despite having been placed correctly by over 60% of participants in Round 2, three items (a) *I have heard about computers and laptops* (item #57), (b) *I am aware that it is possible to buy things on the Internet* (item #143), and (c) *I know that there are risks of using technology* (item #130) were removed. Participants argued convincingly that the items were not representative of the *Technological* construct as defined in the EDL framework. Three items (a) *I can get information about technology issues from social media sites* (item #70), (b) *I can get information about technology issues from people I know* (item #133), and (c) *I ask others about the risks of using digital technologies* (item #22) were placed correctly by 40% of participants. The three items were removed. Although placed correctly by 40% of participants, one item, *I have heard about social media* (item #63), was retained for two reasons: (1) Participants who had correctly placed three similarly worded items into the *Cognitive* construct (*I have heard*….) were unable to explain why item #63 deserved to be placed in the *Technological* construct and (2) Social media sites make up a large part of online interactions (Mohsin, 2019). The remaining 2 of the 13 items that were placed correctly by 60% or less of participants in Round 1 (a) *I can figure out all the risks of using technology* (item #94) and (b) *I can figure out some of the risks of using technology* (item #139) were moved to the *Cognitive* construct. Participants thought both items implied that an individual had performed a sophisticated form of cognitive task not reflected in the other items they had placed in the *Technological* construct.

Summing up, subsequent Round 2 of the *Technological* construct card sorts, of the 42 items placed correctly by at least 80% of participants in Round 1, 1 item was removed. Of the 13 items placed correctly by 60% or fewer of participants in the Round 1, seven were removed; two items were moved into the *Cognitive* construct; and, four were retained. Consequently, subsequent Round 2, the number of items total in the *Technological* construct was reduced to 45 items.

Table 5.1: Technological construct items Rounds 1 and 2

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
1	I know what a private window in an Internet browser (Chrome, Internet Explorer, Safari, etc.) is.	100%	100%
14	I can sync information between multiple devices	100%	100%
17	I know what keyboard shortcuts are.	100%	100%
19	I can use keyboard shortcuts.	100%	100%
35	I can open a private window in an Internet browser.	100%	100%
41	I know what Internet browser bookmarks used for.	100%	100%
49	I use digital technologies to get to meetings.	100%	100%
52	I can save files.	100%	100%
76	I can fix my digital device if it stops working.	100%	100%
91	I know the difference between operating systems and software applications.	100%	100%
95	I can download files from the Internet.	100%	100%
104	I can use bookmarks in my Internet browser.	100%	100%
109	I know how to troubleshoot technology issues.	100%	100%
132	I know how to find the security settings on a digital device.	100%	100%
135	I can makes changes in files (for example a document, a presentation, a spreadsheet, and a video)	100%	100%
136	I can troubleshoot problems with digital technologies.	100%	100%
153	I can save emails on the Internet.	100%	100%
155	I know what the back and forward buttons in an Internet browser are used for.	100%	100%
159	I can find out what is wrong with my digital technologies when they are not working.	100%	100%
160	I can change security settings on a digital device.	100%	100%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
166	I can fill out forms on the Internet.	100%	100%
169	I know the difference between a cellular network and Wi-Fi network.	100%	100%
2	I use digital technologies to get to (places I shop) stores.	100%	80%
15	I use digital technologies to get to events.	100%	80%
33	I use digital technologies to remind me about my appointments.	100%	80%
58	I am aware that digital technologies have security settings.	100%	80%
79	I use digital technology to do calculations.	100%	80%
90	I use digital technologies to remember birthdates.	100%	80%
103	I am aware that files can be downloaded from the Internet.	100%	80%
145	I use digital technologies to get to appointments.	100%	80%
152	I use digital technologies to remind me to do things.	100%	80%
167	I use digital technology to look up information.	100%	80%
25	I can figure out what to do if a digital device is frozen	80%	100%
65	I know what things smartphones are good at doing.	80%	100%
81	I can use a computer mouse.	80%	100%
97	I can use the back and forward buttons in an Internet browser.	80%	100%
122	I know what a mouse is.	80%	100%
67	I know what things computers and laptops are good at doing.	80%	80%
114	I can buy things on the Internet.	80%	80%
138	I use digital technology to fix words I spell wrong.	80%	80%
148	I use digital technologies to remind me of important events.	100%	60%
100	I can get information about technology issues from the Internet.	80%	60%
113	I have heard about smartphones.	60%	100%
86	I can get the information I need to fix basic technological issues.	60%	80%
70	I can get information about technology issues from social media Internet sites.	60%	40%
57	I have heard about computers and laptops.	40%	100%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
39	I have heard about the Internet.	40%	80%
143	I am aware that it is possible to buy things on the Internet.	40%	80%
32	I know what things can be bought on the Internet.	40%	60%
63	I have heard about social media.	40%	60%
94	I can figure out all of the risks of using technology.	40%	0%
130	I know that there are risks of using technology.	20%	60%
139	I can figure out some of the risks of using technology.	20%	0%
22	I ask others about the risks of using digital technologies.	0%	0%
133	I can get information about technology issues from people I know.	0%	0%

Cognitive construct

In Round 1 of the *Cognitive* construct card sorts of the 38 items total, 15 items (39%) were placed correctly by at least 80% of participants. See Table 5.2.

Twenty-four items (63%) were placed correctly by fewer than 80% of participants in Round 1. See Table 5.2. The majority of the 24 items were placed into the social behavior construct, for example, *I discuss the negative risks associated with using the Internet to decide what Internet sites to visit* (item #20), and *I ask others about how my privacy is impacted by digital technologies* (item #61). The minority of the 24 items were sorted into the *Technological* construct. For example, *I can recognize tools that will not help me get the information I need* (item #68), and *I can recognize tools that will get me information in the format (for images, documents, and videos) I need* (item #53).

In Round 2, the number of items placed correctly by at least 80% of participants increased by 18 items. The increase resulted in 33 total items (87%) in the *Cognitive* construct in that percentage range. Seven items were placed correctly by 60% or fewer of participants into the technology or social behavior constructs. See Table 5.2. I agreed with comments made by participants indicating that of the seven items five items (a) *I can quickly look at information on the Internet and tell if it will answer my question* (item #59), (b*) I can get information about technology issues from the Internet* (item #100), (c) *I know how to present information on the Internet so people know what I copied* (item #101), (d) *I follow a process when I am trying to figure out if I should buy a particular technology* (item #110), and (e) *I know how to choose information in a format (article, picture, video, etc.) that will help me best* (item #142) could easily be interpreted as belonging in the *Technological* construct. The five items were removed.

I also agreed with comments made by participants indicating that of the seven items placed by 60% or less of participants in Round 2, two items (a) *I think about how I use digital technologies affects my relationships with people I know* (item #16) and (b) *I share my opinions about how I believe a technology*

should work when it does not work the way I expect (item #102) could easily be interpreted as belonging in the *Social behavioral*. The two items were removed.

Table 5.2: Cognitive construct items Rounds 1 and 2

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
60	I think about the benefits of using digital technologies.	100%	100%
71	I can figure out what information I need.	100%	100%
47	I think about the risks of using digital technologies.	100%	80%
110	I follow a process when I am trying to figure out if I should buy a particular technology.	100%	0%
26	I follow a process when I am trying to figure out if I should use a particular app.	80%	100%
124	I can tell if my search words will get me information, I need.	80%	100%
140	I can come up with useful search words.	80%	100%
162	I follow a process when I am trying to figure out if I should use a particular Internet site.	80%	100%
48	I know how to change search words if I am having problems find the information I want.	80%	80%
73	I know if information I am looking at on the Internet real or fake.	80%	80%
125	I know how to find out if something I am looking at on the Internet is real or fake.	80%	80%
141	I know what do if my search words are not getting me the information I need.	80%	80%
163	I know how to modify search words to look for specific types of information.	80%	80%
100	I can get information about technology issues from the Internet.	80%	60%
59	I can quickly look at information on the Internet and tell if it will answer my question.	80%	60%
142	I know how to choose information in a format (article, picture, video, etc.) that will help me best.	80%	60%
68	I can recognize tools that will not help me get the information I need.	60%	100%
154	I think about how my privacy is affected by digital technologies.	60%	80%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
20	I discuss the negative risks associated with using the Internet to decide what Internet sites to visit.	40%	100%
137	I can tell where information on Internet comes from.	40%	100%
161	I discuss ways to use digital technologies that their creators may not have intended.	40%	100%
3	I discuss the benefits of digital technologies to decide if I should use it.	40%	80%
80	I use digital technology to learn.	40%	80%
16	I think about how I use digital technologies affects my relationships with people I know.	40%	40%
46	I discuss the benefits associated with using the Internet to decide what Internet sites to visit.	20%	100%
129	I answer people's questions about the benefits of using digital technologies.	20%	100%
24	I use digital technology to make decisions.	20%	80%
30	I answer other people's questions about the risks of using digital technologies.	20%	80%
53	I can recognize tools that will get me information in the format (for images, documents, and videos) I need.	20%	80%
149	I discuss the security features of digital technologies to decide if I should use it.	20%	80%
101	I know how to present information on the Internet so people know what I copied.	20%	60%
102	I share my opinions about how I believe a technology should work when it does not work the way I expect.	20%	40%
43	I know how to use the information I find on the Internet in a way that does not break the law.	0%	100%
72	I use digital technology to help me remember things.	0%	100%
108	When I use information found on the Internet, I include the URL so other people can find it.	0%	100%
123	I can use Internet tools to get the things I need.	0%	100%
151	I ask others about the benefits of using digital technologies.	0%	100%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
56	I know how to present information on the Internet so people know where I found it.	0%	80%
61	I ask others about how my privacy is impacted by digital technologies.	0%	80%
147	I ask others about how using digital technologies affects my relationships with people.	0%	80%

Social behavioral construct

In Round 1 of the *Social behavioral* construct card sorts, of the 67 items total 33 items (49%) were placed correctly by at least 80% of participants. See Table 5.3. Thirty-four items (51%) were placed correctly by 60% or fewer of participants. Participants felt that the majority of the 34 items could be placed in multiple constructs. Ultimately, participants placed the items into the construct they decided was most representative of its content. An analysis of the multiple construct placement of items is discussed below.

Participants noted that although seven items (a) *I am sad when someone shares something sad online* (item #50), (b*) I remain calm when people intentionally do something on the Internet to make me angry* (item #34), (c) *I remain calm when I read something on the Internet that makes me angry* (item #69), (d) *I remain calm when people do something on the Internet that makes me angry* (item #75), (e) *I am happy when someone shares something happy online* (item #96), (f) *When people criticize me on the Internet, I try to understand their point of view* (item #118), and (g) *I pay attention to the feelings that come through the things people post on the Internet* (item #128) indicated slightly social behavioral content, they found the feeling content of the items to be more pronounced and placed them into the *Affective* construct. All seven items were removed.

Participants noted that although two items (a) *I see how someone is feeling by looking the images they put online* (item #37), and (b) *I can study different topics on the Internet by myself* (item #54) could be interpreted as social behaviors, they thought that the cogitative dimension of the behaviors was the actual focus of the items and placed them into the *Cognitive* construct. Two items (c) *I focus on tasks while receiving unrelated online notifications* (item #144), and (d) *I can finish tasks on time on the Internet by myself* (item #18) were also placed into the *Cognitive* construct. Participants thought the items' *social behavioral* content was less pronounced than their cognitive content. The four items were removed.

Participants found seven items (a) *I can finish tasks on time on the Internet by myself* (item #85), (b) *I respond to popups that open when I am working on something* (item #77), (c) *I respond to non-emergency alerts and notifications on digital devices when I have something to do* (item #106), (d) *I respond to emails when I am working on something* (item #107), (e) *I can search the Internet to find people who have interests similar to mine* (item #146), and (f) *I send emails to get help when I am having problems doing something on the Internet* (item #7) to be indicative of a person's interaction with

technology rather than social behaviors per se. Thus, participants placed them into the *Technological* construct. The seven items were removed.

Seven items (a) *I can find people I know by searching the Internet* (item #21), (b) *I remain calm when someone sends me something on the Internet that makes me angry* (item #127), (c) *I see how someone is feeling by reading the post they put online* (item #131), (d) *I understand the rules for different Internet websites* (item #126), (e) *I can get information about technology issues from stores* (item #8), (f) *I look for the help button on when I am having problems doing something on the Internet* (item #29), and (g) *I can use digital technologies to invite people to do things with me* (item #119) were placed correctly by 40% or fewer of participants. The seven items were removed.

Table 5.3: Social behavioral construct items Rounds 1 and 2

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
6	I compliment people online.	100%	100%
28	I have many friends on the Internet.	100%	100%
31	I ask for help on the Internet when I am having trouble doing something.	100%	100%
42	I invite people to make comments on things I put on the Internet.	100%	100%
55	I have conversations with people using text messages.	100%	100%
66	I have conversations with people using digital technologies.	100%	100%
74	I offer help to people on the Internet if they ask.	100%	100%
78	I join conversations on social media Internet sites.	100%	100%
84	I join conversations on the Internet.	100%	100%
92	When I am looking for someone the first thing I do is send them a message.	100%	100%
93	I join groups on social media Internet sites.	100%	100%
112	I offer help to people on the Internet if I see they are having problems.	100%	100%
115	I offer help to people on the Internet if I see they need help.	100%	100%
121	I join groups on the Internet.	100%	100%
150	I have discussions with people on the Internet.	100%	100%
156	I send chat invitations to people with similar interests as me.	100%	100%
27	I apologize if someone says something that I posted on the Internet is offensive.	100%	80%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
83	When people criticize me on the Internet, I block them from seeing my stuff.	100%	80%
117	It is easy for me to make friends on the Internet.	100%	80%
165	If someone teases me on the Internet, I ignore the person.	100%	80%
23	I send chat invitations to people I want to talk with.	80%	100%
44	I share things I find on the Internet with people on the Internet.	80%	100%
89	I know how to make friends on the Internet.	80%	100%
98	I send invitations to people I want to play games with.	80%	100%
134	I change the way I say things on the Internet if I think it will hurt someone's feelings.	80%	100%
164	If the owners of a website asks me not to do something, I will not do it.	80%	100%
12	I follow the rules for the websites I visit.	100%	60%
11	If someone teases me on the Internet, I tease them back.	80%	80%
62	When people criticize me on the Internet, I criticize them back.	80%	80%
88	If someone teases me on the Internet, I let it go.	80%	80%
99	If someone teases me on the Internet, I let the website owners know.	80%	80%
7	I send emails to get help when I am having problems doing something on the Internet.	80%	60%
118	When people criticize me on the Internet, I try to understand their point of view.	80%	60%
118	When people criticize me on the Internet, I try to understand their point of view.	80%	60%
10	I share my feelings with people using emoticons like smiley faces.	60%	100%
40	I use emoticons like thumbs up to cheer people on.	60%	100%
87	I use emoticons like smiley faces to tell people online I like something they shared.	60%	100%
120	I use emoticons like clapping hands to tell people online I like something they posted.	60%	100%
38	When people criticize me on the Internet I try to use their comments to improve myself.	60%	80%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
37	I see how someone is feeling by looking the images they put online.	60%	60%
128	I pay attention to the feelings that come through the things people post on the Internet.	60%	60%
131	I see how someone is feeling by reading the post they put online.	60%	40%
9	I express my feelings when people offend me on the Internet.	40%	100%
13	I communicate with people I know using digital technologies.	40%	100%
111	I express my feelings to people on the Internet when they do stuff to offend me.	40%	100%
168	I share my feelings with people on the Internet.	40%	80%
107	I respond to emails when I am working on something.	40%	60%
146	I can search the Internet to find people who have interests similar to mine.	40%	60%
126	I understand the rules for different Internet websites.	40%	20%
8	I can get information about technology issues from stores.	40%	0%
144	I focus on tasks while receiving unrelated online notifications.	20%	100%
54	I can study different topics on the Internet by myself.	20%	60%
69	I remain calm when I read something on the Internet that makes me angry.	20%	60%
77	I respond to popups that open when I am working on something.	20%	60%
106	I respond to non-emergency alerts and notifications on digital devices when I have something to do.	20%	60%
119	I can use digital technologies to invite people to do things with me.	20%	0%
82	I ask for help on the Internet when I am having trouble doing something. (2)	0%	100%
4	I enjoy it when someone people say something I posted on the Internet is funny.	0%	80%
18	I can finish tasks on time on the Internet by myself.	0%	60%
34	I remain calm when people intentionally do something on the Internet to make me angry.	0%	60%
50	I am sad when someone shares something sad online.	0%	60%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
75	I remain calm when people do something on the Internet that makes me angry.	0%	60%
85	I can finish things on the Internet by myself without help from other people.	0%	60%
96	I am happy when someone shares something happy online.	0%	60%
21	I can find people I know by searching the Internet.	0%	40%
127	I remain calm when someone sends me something on the Internet that makes me angry.	0%	40%
29	I look for the help button on when I am having problems doing something on the Internet.	0%	0%
10	I share my feelings with people using emoticons like smiley faces.	60%	100%
40	I use emoticons like thumbs up to cheer people on.	60%	100%
87	I use emoticons like smiley faces to tell people online I like something they shared.	60%	100%
120	I use emoticons like clapping hands to tell people online I like something they posted.	60%	100%
38	When people criticize me on the Internet I try to use their comments to improve myself.	60%	80%
37	I see how someone is feeling by looking the images they put online.	60%	60%
128	I pay attention to the feelings that come through the things people post on the Internet.	60%	60%
131	I see how someone is feeling by reading the post they put online.	60%	40%
9	I express my feelings when people offend me on the Internet.	40%	100%
13	I communicate with people I know using digital technologies.	40%	100%
111	I express my feelings to people on the Internet when they do stuff to offend me.	40%	100%
168	I share my feelings with people on the Internet.	40%	80%
107	I respond to emails when I am working on something.	40%	60%
146	I can search the Internet to find people who have interests similar to mine.	40%	60%
126	I understand the rules for different Internet websites.	40%	20%
8	I can get information about technology issues from stores.	40%	0%

		% of construct items placed correctly	
Item no.	**Item content**	**Round 001**	**Round 002**
144	I focus on tasks while receiving unrelated online notifications.	20%	100%
54	I can study different topics on the Internet by myself.	20%	60%
69	I remain calm when I read something on the Internet that makes me angry.	20%	60%
77	I respond to popups that open when I am working on something.	20%	60%
106	I respond to non-emergency alerts and notifications on digital devices when I have something to do.	20%	60%
119	I can use digital technologies to invite people to do things with me.	20%	0%
82	I ask for help on the Internet when I am having trouble doing something. (2)	0%	100%
4	I enjoy it when someone people say something I posted on the Internet is funny.	0%	80%
18	I can finish tasks on time on the Internet by myself.	0%	60%
34	I remain calm when people intentionally do something on the Internet to make me angry.	0%	60%
50	I am sad when someone shares something sad online.	0%	60%
75	I remain calm when people do something on the Internet that makes me angry.	0%	60%
85	I can finish things on the Internet by myself without help from other people.	0%	60%
96	I am happy when someone shares something happy online.	0%	60%
21	I can find people I know by searching the Internet.	0%	40%
127	I remain calm when someone sends me something on the Internet that makes me angry.	0%	40%
29	I look for the help button on when I am having problems doing something on the Internet.	0%	0%

Affective construct results

In Round 1 of the Affective construct card sorts, of the nine items total, four items (44%) were placed correctly by at least 80% of participants. See Table 5.4. Five items (56%) were placed correctly by 60% or fewer of participants. Participants considered that the actions indicated by the five items were the focus of the content rather than the feeling invoked by the action. For example, two items (a) How do you feel about participating in discussions on the Internet (item #45), and (b) How do you feel about sharing information with people on the Internet (item #51) were placed into the *Social behavioral*

construct; one item, How do you feel about adjusting the security settings on a digital device (item #64) was placed into either the *Technological* or *Cognitive* constructs.

In Round 2 of the *Affective* construct card sorts, of the nine items total each was placed correctly by 100% of participants. See Table 5.4. All nine items in the *Affective* construct were retained.

Table 5.4: Affective construct items' placement results: Rounds 1 and 2

	Affective	**% of construct items placed correctly**	
Item no.	**Item content**	**Round 1**	**Round 2**
105	How do you feel about using digital devices to remember things?	80%	100%
36	How do you feel searching for information on the Internet?	80%	100%
157	How do you feel about your choosing a trustworthy website for information?	80%	100%
158	How do you feel about completing forms on the Internet?	80%	100%
51	How do you feel about sharing information with people on the Internet?	60%	100%
45	How do you feel about participating in discussions on the Internet?	60%	100%
64	How do you feel about adjusting the security settings on a digital device?	60%	100%
116	How do you feel about finding files on a digital device?	60%	100%
5	How do you feel about obeying the rules of a website?	60%	100%

Sub-constructs card sorts results

Each of the four top level primary constructs of the EDL framework subordinate a group of second level related sub-constructs. In the following section, the results of each round of sub-construct card sorts will be discussed.

Technological sub-constructs card sorts results

In the Round 1 of the *Technological* sub-constructs card sorts, 100% of the number of total items in each sub-construct was placed correctly by at least 80% of participants: Knowledge sub-construct (Table 5.5), 11 items total; Capabilities sub-construct (Table 5.6), 18 items total; Embodied Cognition sub-construct (Table 5.7), 11 items total; and Awareness sub-construct (Table 5.8), 7 items total.

In Round 2, of the 11 total items in the *Knowledge* sub-construct 10 items (91%) were placed correctly by at least 80% of participants. One item, *I know what things computers and laptops are good at doing* (item #67), was placed correctly by 60% of participants. Of the 18 total items in the *Capabilities* sub-construct (see Table 5.6) 100% were placed correctly by at least 80% of participants. Of the 11 total items in the *Embodied cognition-technological* sub-construct (Table 10) 8 items (73%) were placed correctly by at least 80% of participants. One item, *I use digital technology to fix words I spell wrong*

(item #138) was placed correctly by 60% of participants. Two items (a) *I use digital technology to do calculation* (item #79) and (b) *I use digital technology to look up information* (item #167) were placed correctly by 40% of participants. Of the seven total items in the *Awareness* sub-construct 100% were placed correctly by at least 80% of participants.

Table 5.5: Sub-construct: Knowledge items

	Knowledge	**% of construct items placed correctly**	
Item no.	**Item content**	**Round 1**	**Round 2**
91	I know the difference between operating systems and software applications.	100%	100%
169	I know the difference between a cellular network and Wi-Fi network.	100%	100%
1	I know what a private window in an Internet browser (Chrome, Internet Explorer, Safari, etc.) is.	100%	80%
17	I know what keyboard shortcuts are.	100%	80%
41	I know what Internet browser bookmarks used for.	100%	80%
65	I know what things smartphones are good at doing.	100%	80%
122	I know what a mouse is.	100%	80%
155	I know what the back and forward buttons in an Internet browser are used for.	100%	80%
67	I know what things computers and laptops are good at doing.	100%	60%
109	I know how to troubleshoot technology issues.	80%	100%
132	I know how to find the security settings on a digital device.	80%	80%

Table 5.6: Sub-construct: Capabilities items

	Capabilities	**% of construct items placed correctly**	
Item no.	**Item content**	**Round 1**	**Round 2**
14	I can sync information between multiple devices	100%	100%
19	I can use keyboard shortcuts.	100%	100%
25	I can figure out what to do if a digital device is frozen	100%	100%
35	I can open a private window in an Internet browser.	100%	100%
52	I can save files.	100%	100%
95	I can download files from the Internet.	100%	100%

	Capabilities	% of construct items placed correctly	
Item no.	**Item content**	**Round 1**	**Round 2**
97	I can use the back and forward buttons in an Internet browser.	100%	100%
135	I can makes changes in files (for example a document, a presentation, a spreadsheet, and a video)	100%	100%
160	I can change security settings on a digital device.	100%	100%
166	I can fill out forms on the Internet.	100%	100%
86	I can get the information I need to fix basic technological issues.	100%	80%
114	I can buy things on the Internet.	100%	80%
136	I can troubleshoot problems with digital technologies.	100%	80%
159	I can find out what is wrong with my digital technologies when they are not working.	100%	80%
153	I can save emails on the Internet.	80%	100%

Table 5.7: Sub-construct: Embodied Cognition items

	Embodied cognition	% of construct items placed correctly	
Item no.	**Item content**	**Round 1**	**Round 2**
15	I use digital technologies to get to events.	100%	80%
33	I use digital technologies to remind me about my appointments.	100%	80%
49	I use digital technologies to get to meetings.	100%	80%
72	I use digital technology to help me remember things.	100%	80%
79	I use digital technology to do calculations.	100%	40%
90	I use digital technologies to remember birthdates.	100%	80%
138	I use digital technology to fix words I spell wrong.	100%	60%
145	I use digital technologies to get to appointments.	100%	80%
152	I use digital technologies to remind me to do things.	100%	80%
167	I use digital technology to look up information.	100%	40%
2	I use digital technologies to get to (places I shop) stores.	80%	80%

Table 5.8: Sub-construct: Awareness items

	Awareness	% of construct items placed correctly	
Item no.	**Item content**	**Round 1**	**Round 2**
113	I have heard about smartphones.	100%	100%
57	I have heard about computers and laptops.	100%	80%
39	I have heard about the Internet.	100%	80%
63	I have heard about social media.	100%	80%
143	I am aware that it is possible to buy things on the Internet.	100%	80%
58	I am aware that digital technologies have security settings.	80%	100%
103	I am aware that files can be downloaded from the Internet.	80%	100%

Cognitive sub-constructs card sorts results

In the Round 1 of the Cognitive sub-constructs card sorts, of the 18 total items in the *Critical thinking and decision-making about digital tools and digital spaces sub-construct* (Table 5.9) 15 items (83%) were placed correctly by at least 80% of participants. Three items (17%) (a) *I follow a process when I am trying to figure out if I should use a particular app* (item #26), (b) *I follow a process when I am trying to figure out if I should buy a particular technology* (item #110), and (c) *I follow a process when I am trying to figure out if I should use a particular Internet site* (item #162) were placed correctly by 60% of participants. Participants found that the processes indicated by the items did not involve enough exercise of critical thinking to warrant placement in the *Critical thinking and decision making about digital tools* sub-construct. Thus, they placed them into the *Information seeking, evaluation and use* sub-construct.

In Round 2, 16 items (89%) were placed correctly by at least 80% of participants. Two items (a) *I follow a process when I am trying to figure out if I should use a particular Internet site* (item #162) and (b) *I discuss the benefits associated with using the Internet to decide what Internet sites to visit* (item #46) were correctly placed by 60% of participants. Item #162 was placed correctly 60% of participants in Round 1. Item #46, was placed correctly by 100% of participants in Round 1.

In Round 3, 13 items (72%) were placed correctly by at least 80% of participants. Five items were placed correctly by less than 80% of participants. Of the five items, two items (a) *discuss the benefits associated with using the Internet to decide what Internet sites to visit* (item #46) and (b) *I answer people's questions about the benefits of using digital technologies* (item #129) were placed correctly by 60% of participants. Three items (c) *I follow a process when I am trying to figure out if I should use a particular app* (item #26), (d) *I follow a process when I am trying to figure out if I should buy a particular technology* (item #110), and (e) *I follow a process when I am trying to figure out if I should use a particular Internet site* (item #162) were placed correctly by 40% or fewer of participants. Curiously, despite items #26, #110, #162 not having been modified across rounds, all 3 items had been correctly placed by 60% or more of participants in Round 2.

Table 5.9: Sub-construct: Critical thinking and decision-making about digital tools and spaces items

	Critical thinking and decision making about digital tools and spaces	% of construct items placed correctly		
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**
3	I discuss the benefits of digital technologies to decide if I should use it.	100%	100%	80%
22	I ask others about the risks of using digital technologies.	100%	100%	80%
60	I think about the benefits of using digital technologies.	100%	100%	80%
61	I ask others about how my privacy is impacted by digital technologies.	100%	100%	80%
94	I can figure out all of the risks of using technology.	100%	100%	80%
139	I can figure out some of the risks of using technology.	100%	100%	80%
149	I discuss the security features of digital technologies to decide if I should use it.	100%	100%	80%
151	I ask others about the benefits of using digital technologies.	100%	100%	80%
154	I think about how my privacy is affected by digital technologies.	100%	100%	80%
20	I discuss the negative risks associated with using the Internet to decide what Internet sites to visit.	100%	80%	80%
47	I think about the risks of using digital technologies.	100%	80%	80%
46	I discuss the benefits associated with using the Internet to decide what Internet sites to visit.	100%	60%	60%
30	I answer other people's questions about the risks of using digital technologies.	80%	100%	80%
161	I discuss ways to use digital technologies that their creators may not have intended.	80%	100%	80%
129	I answer people's questions about the benefits of using digital technologies.	80%	100%	60%
26	I follow a process when I am trying to figure out if I should use a particular app.	60%	100%	40%
110	I follow a process when I am trying to figure out if I should buy a particular technology.	60%	100%	20%
162	I follow a process when I am trying to figure out if I should use a particular Internet site.	60%	60%	20%

In Round 1 of the *Information seeking, evaluation and use* sub-construct card sorts (Table 5.10), of the 16 total items, 6 items (37.5%) were placed correctly by at least 80% of participants. Ten items (a) *I know how to present information on the Internet so people know what I copied* (b) *I know how to*

present information on the Internet so people know where I found it (c) *I can recognize tools that will get me information in the format (for images, documents, and videos) I need* (d) *I can figure out what information I need* (e) *I know how to choose information in a format (article, picture, video, etc.) that will help me best* (f) *I know how to use the information I find on the Internet in a way that does not break the law* (g) *I can tell where information on Internet comes from* (h) *I know how to find out if something I am looking at on the Internet is real or fake* (i) *I know if information I am looking at on the Internet real or fake, and* (j) *I use digital technology to make decisions* were placed correctly by 60% or fewer of participants. Participants' comments revealed that the phrasing of the items in the sub-construct could be modified to be clearer. I tended to think that the misplacement of the majority of the ten items was more likely due to the label of the sub-construct. Consequently, I modified the *information seeking and use* sub-construct label to read *information seeking, evaluation, and use*.

In Round 2, of the 16 total items 14 items (87.5%), were placed correctly by at 80% of participants. Two items were placed correctly by 60% or fewer of participants: (a) I *know how to use the information I find on the Internet in a way that does not break the law* (item #43) and (b) *I use digital technology to make decisions* (item #24). Both items were placed correctly by 40% or fewer of participants in Round 1. Of the ten items that were placed correctly by 60% or fewer of participants in Round 1, all 10 performed significantly better in Round 2, indicating that the modification of the sub-construct label provided participants with greater clarity.

In Round 3, of the 16 items total, 15 items (94%) were placed correctly by at least 80% of participants. Having been placed correctly by 40% or fewer of participants across all three rounds, item #24 *I use digital technology to make decisions* was removed.

Table 5.10: Sub-construct: Information seeking, evaluation, and use items

	Information seeking, evaluation, and use	**% of construct items placed correctly**		
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**
48	I know how to change search words if I am having problems find the information I want.	100%	100%	100%
140	I can come up with useful search words.	100%	100%	100%
163	I know how to modify search words to look for specific types of information.	100%	100%	100%
124	I can tell if my search words will get me information, I need.	80%	100%	100%
141	I know what do if my search words are not getting me the information I need.	80%	100%	100%
68	I can recognize tools that will not help me get the information I need.	80%	80%	100%
101	I know how to present information on the Internet so people know what I copied.	60%	100%	100%

	Information seeking, evaluation, and use	% of construct items placed correctly		
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**
56	I know how to present information on the Internet so people know where I found it.	60%	100%	80%
53	I can recognize tools that will get me information in the format (for images, documents, and videos) I need.	60%	80%	80%
71	I can figure out what information I need.	40%	100%	100%
142	I know how to choose information in a format (article, picture, video, etc.) that will help me best.	40%	100%	100%
43	I know how to use the information I find on the Internet in a way that does not break the law.	40%	60%	80%
137	I can tell where information on Internet comes from.	20%	100%	100%
125	I know how to find out if something I am looking at on the Internet is real or fake.	20%	100%	80%
73	I know if information I am looking at on the Internet real or fake.	20%	80%	80%
24	I use digital technology to make decisions.	20%	40%	20%

Social behaviors sub-constructs card sorts results

In Round 1 of the *Peer-relationship* sub-construct card sorts (Table 5.11), of the 25 total items, 17 items (68%) were placed correctly by at least 80% of participants. Eight items were placed correctly by 60% or fewer of participants. Of the eight items, two items (a) *I apologize if someone says something that I posted on the Internet is offensive (item #27)* and (b) *I apologize if someone says something that I posted on the Internet is offensive (item #134)* were placed by 40% or fewer in the *Self-management* sub-construct. Participants interpreted the activities as dealing with regulating one's conduct. Three items (c) *I offer help to people on the Internet if they ask* (item #74), (d) *I offer help to people on the Internet if I see they are having problems* (item #112), and (e) *I offer help to people on the Internet if I see they need help* (item #115) were placed by 40% of participants into the *Academic behaviors* sub-construct. Three items (f) *I invite people to make comments on things I put on the Internet* (item #42) (g) *When I am looking for someone the first thing I do is send them a message* (item #92), and (h) *I share my feelings with people on the Internet* (item #168) were placed by 60% of participants in the *Peer-relationships* sub-construct.

In Round 2, of the 25 total items, 16 items (64%) were placed correctly by at least 80% of participants. Eight items were placed correctly by 60% or fewer of participants. Three items were placed correctly by 40% or fewer of participants. One item was placed correctly by less than 20% of participants. Of the eight items placed correctly by 60% or fewer of participants in Round 1, two items (a) I *apologize if someone says something that I posted on the Internet is offensive* (item #27), and (b) *I offer help to people on the Internet if I see they need help* (item #115) were placed correctly by at least 80% in Round

2. The result suggests that the changes made to increase the likelihood that participants would place items into the correct sub-construct were not successful.

In Round 3, of the 25 total items, 18 items (72%) were placed correctly by at least 80% participants. Seven items were placed correctly by 60% or fewer of participants. Of the seven items, five were placed correctly by less than 50% of participants in Round 2.

In Round 4, of the 25 total items, 21 items (84%) were placed correctly by at least 80% participants. Four items (16%) were placed correctly by 50% of participants. Of the four items, (a) *I invite people to make comments on things I put on the Internet* (item #42), (b) *I know how to make friends on the Internet* (item #89), and (c) *When I am looking for someone the first thing I do is send them a message* (item # 92) were removed because they had performed poorly across the three rounds despite attempts to make the card items less ambiguous.

Table 5.11: Sub-construct: peer relationships items

	Peer relationship behaviors	**% of construct items placed correctly**			
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**	**Round 4**
13	I communicate with people I know using digital technologies.	100%	100%	100%	100%
28	I have many friends on the Internet.	100%	100%	100%	100%
66	I have conversations with people using digital technologies.	100%	100%	100%	100%
87	I use emoticons like smiley faces to tell people online I like something they shared.	100%	100%	100%	100%
55	I have conversations with people using text messages.	100%	100%	100%	75%
4	I enjoy it when someone people say something I posted on the Internet is funny.	100%	100%	80%	75%
40	I use emoticons like thumbs up to cheer people on.	100%	100%	80%	75%
120	I use emoticons like clapping hands to tell people online I like something they posted.	100%	100%	80%	100%
10	I share my feelings with people using emoticons like smiley faces.	100%	83%	80%	75%
6	I compliment people online.	80%	100%	80%	100%
150	I have discussions with people on the Internet.	80%	100%	80%	100%
98	I send invitations to people I want to play games with.	80%	83%	80%	100%
117	It is easy for me to make friends on the Internet.	80%	83%	80%	50%

	Peer relationship behaviors	% of construct items placed correctly			
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**	**Round 4**
23	I send chat invitations to people I want to talk with.	80%	67%	80%	100%
89	I know how to make friends on the Internet.	80%	67%	40%	50%
156	I send chat invitations to people with similar interests as me.	80%	50%	80%	
44	I share things I find on the Internet with people on the Internet.	80%	33%	100%	75%
168	I share my feelings with people on the Internet.	60%	83%	80%	
92	When I am looking for someone the first thing I do is send them a message.	60%	67%	80%	50%
42	I invite people to make comments on things I put on the Internet.	60%	67%	20%	50%
27	I apologize if someone says something that I posted on the Internet is offensive.	40%	100%	60%	75%
115	I offer help to people on the Internet if I see they need help.	40%	83%	60%	75%
112	I offer help to people on the Internet if I see they are having problems.	40%	67%	60%	75%
74	I offer help to people on the Internet if they ask.	40%	67%	40%	100%
134	I change the way I say things on the Internet if I think it will hurt someone's feelings.	20%	17%	40%	75%

In Round 1 of *the Assertive behaviors* sub-construct card sorts (Table 5.12), of the 6 total items, one item (17%), *I express my feelings when people offend me on the Internet* (item #9) was placed correctly at least by 80% of participants. Five items (83%) were placed correctly by 60% or fewer of participants. Of the five items, one item, *I express my feelings to people on the Internet when they do stuff to offend me* (item #111), was placed by 40% of participants into the *Self-management* sub-construct; one item *I join groups on the Internet* (item #121) was placed by 80% of participants into *Academic behaviors* sub-construct. Three items (c) *I join conversations on social media Internet sites* (item #78), (d) *I join groups on social media Internet sites* (item #93), and (e) *I join conversations on the Internet* (item #84) were placed by 100% of participants into Peer relationship behaviors. Participants said that although they understood the act of joining as being something an assertive person does, they interpreted the phrasing of the items as being indicative of peer-relationship building activities. Their feedback led me to brainstorm adjectives and adverbs that would connote assertive behaviors. The brainstorming resulted in the modifiers listed below:

- Deliberately
- Pointedly
- Purposefully

- Eagerly
- Proactively
- Enthusiastically
- Anxiously
- Intently
- Impatiently
- Confidently
- Firmly

I chose the adverb *confidently,* and modified the phrasing of all four items to read, *I confidently join …*

In Round 2, of the six total items, two items (a) *I express my feelings when people offend me on the Internet* (item #9), and (b) *I express my feelings to people on the Internet when they do stuff to offend me* (item #111) were placed correctly by at least 80% of participants, demonstrating a slight improvement in performance. Four items (a) *I join conversations on social media Internet sites*, (b) *I join conversations on the Internet*, (c) *I join groups on social media Internet sites*, and (d) *I join conversations on the Internet* (item #84) were placed correctly by 50% or fewer of participants.

Although the overall correct placement rate of the six items total improved, suggesting that the adverbial modification of phrasing was beneficial, comments from participants indicated that the choice of adverb, i.e. "confidently," did not effectively differentiate the phrasing of assertive behaviors from peer-relationship building behaviors. Mindful of participants' comments, I replaced the adverb "confidently" by "proactively" to build out the intentional and initiative dimensions of assertive behaviors.

In Round 3, although the correct placement rate of the four items that had been placed correctly by 50% or less of participants in Round 2 improved by 10% or less, 40% or more of participants continued to place the items into the *Peer relationship behaviors* sub-construct as they had done previously in Round 2. Participants agreed that the adverbial substitution of *confidently* by *proactively* was successful in bringing out the intentional and initiative dimensions of assertive behaviors. Nonetheless, the adverbial modification did not dissuade participants from placing the items into the *Peer relationship behaviors* sub-construct.

In Round 4, although the number of items placed correctly by participants across the previous three rounds grew to 50%, of the 6 items total in the *Assertive behaviors* sub-construct, the correct placement of three items dropped to performance rates similar to Rounds 1 and 2. After analyzing the data across the four rounds, I removed three items (a) *I proactively join conversations on the Internet* (item #8), (b) *I proactively join groups on social media Internet sites* (item #93), and (c) *I proactively join groups on the Internet* (item #121) because they performed poorly in at least three rounds, typically being placed in the *Peer relationship behavior* sub-construct.

Table 5.12: Sub-construct: assertive items

	Assertive	% of construct items placed correctly			
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**	**Round 4**
9	I express my feelings when people offend me on the Internet.	80%	100%	100%	75%
111	I express my feelings to people on the Internet when they do stuff to offend me.	60%	100%	100%	75%
78	I join conversations on social media Internet sites.	20%	50%	60%	75%
93	I join groups on social media Internet sites.	20%	33%	40%	25%
121	I join groups on the Internet.	20%	33%	40%	50%
84	I join conversations on the Internet.	0%	50%	60%	50%

In Round 1 of the *Academic behaviors* sub-construct card sorts (Table 5.13), of the two total items (a) *I ask for help on the Internet when I am having trouble doing something* (item #31), and (b) *I ask for help on the Internet when I am struggling something* (item #82) both items were placed correctly by 60% of participants. Forty percent of participants placed the items in the *Self-management* sub construct.

In the Rounds 2 and 3, of the two total items, both of these items were placed correctly by 83% of the participants. In Round 4, the performance rate of the two items dropped to 50%.

I decided to remove the *Academic behavior* sub-construct for two reasons:(1) although both items were placed correctly by at least 60% of participants in Rounds 1, 2, and 3, participants did not see a strong relationship between the sub-construct label *Academic* behaviors and the top level primary construct label, *Social behaviors*. Mindful of the participants recommendations, I suggested re-labeling the sub-construct to read *inquiry and learning behaviors*. Participants thought that the modified sub-construct label had greater relevance than did Academic behaviors. However, they did not think that the modified sub-construct label Inquiry and learning behaviors in and of itself strengthened the relationship between the sub-construct and the primary construct *Social behaviors*, and (2) I realized at the conclusion of Round 4 that I wanted to have at least three card items to represent each sub-construct and only had two.

Table 5.13: Sub-construct: academic

	Academic behaviors	% of construct items placed correctly			
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**	**Round 4**
31	I ask for help on the Internet when I am having trouble doing something.	60%	83%	83%	50%
82	I ask for help on the Internet when I am struggling something.	60%	83%	83%	50%

In Round 1 of the *Self-management behaviors* sub-construct card sorts (see Table 5.14), of the eight total items, 5 items (63%) were placed correctly by at least 80% of participants. Three items (a) *If someone teases me on the Internet, I tease them back* (item #11), (b) *When people criticize me on the*

Internet, I criticize them back (item #62), and (c) *If someone teases me on the Internet, I let the website owners know* (item #99) were placed by 40% of participants into *Assertive behaviors* sub-construct.

In Round 2, the number of items placed correctly by at least 80% of participants decreased to 3 items (42%). Three items, (a) *When people criticize me on the Internet, I block them from seeing my stuff* (item #83), (b) *If someone teases me on the Internet, I let it go* (item #88), and (c) *If someone teases me on the Internet, I ignore the person* (item #165), which were placed correctly by at least 80% of participants in Round 1, were placed correctly by only 60% of participants in Round 2. There were some inconsistencies in card placement that I cannot explain due primarily to the struggle of participants to explain their choice of card placements. For example, item #83, *When people criticize me on the Internet,* was placed by 80% of participants in the *Assertive behaviors* sub-construct; 17% of participants in the *Peer relationships* sub-construct; and, 0% of participants in the *Self-management behaviors* sub-construct. Item #62, *When people criticize me on the Internet, I criticize them back* was placed by 100% of participants into the *Self-management behaviors* sub-construct.

In Round 3, three items (a) *If someone teases me on the Internet, I ignore the person* (item #165), (b) *If someone teases me on the Internet, I tease them back* (item #11), and (c) *When people criticize me on the Internet, I criticize them back* (item #62)were placed correctly by at least 80% of participants, resulting in an increase to 63%. Three items (a) *If someone teases me on the Internet, I let it go* (item #88), (b) *When people criticize me on the Internet, I block them from seeing my stuff* (item #83), and (c) *If someone teases me on the Internet, I let the website owners know* (item #99), were placed correctly by 60% or fewer of participants. The latter 3 items had performance issues in previous rounds as well.

In Round 4, total number of card items, placed correctly by at least 80% of participants remained the same as Round 3. The number of participants that successfully placed item #83, *When people criticize me on the Internet, I block them from seeing my stuff* rose to 75%. Two items (a) *When people criticize me on the Internet I try to use their comments to improve myself* (item #38) and (b) *If someone teases me on the Internet, I let the website owners know* (item #99) were placed correctly by 50% of participants. Two items were removed. One item, "*If someone teases me on the Internet, I let the website owners know* (item #99) consistently had performance issues, often placed in the *Assertive behaviors* sub-construct despite wordsmithing efforts. The item was removed. One item, *When people criticize me on the Internet I try to use their comments to improve myse*lf (item #38), despite having performed well in Rounds 1, 2, and 3, participants found this item to be indicative of reflection rather than performative action exercised by an individual. The item was removed.

Table 5.14: Sub-construct: self-management items

		% of construct items placed correctly			
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**	**Round 4**
38	When people criticize me on the Internet I try to use their comments to improve myself.	100%	83%	80%	50%
165	If someone teases me on the Internet, I ignore the person.	100%	67%	80%	100%
88	If someone teases me on the Internet, I let it go.	100%	67%	60%	100%

		% of construct items placed correctly			
Item no.	**Item content**	**Round 1**	**Round 2**	**Round 3**	**Round 4**
144	I focus on tasks while receiving unrelated online notifications.	80%	100%	100%	100%
83	When people criticize me on the Internet, I block them from seeing my stuff.	80%	0%	60%	75%
11	If someone teases me on the Internet, I tease them back.	40%	100%	80%	100%
62	When people criticize me on the Internet, I criticize them back.	40%	100%	80%	100%
99	If someone teases me on the Internet, I let the website owners know.	40%	17%	0%	50%

In Rounds 1, 2, 3, and 4 of the *Compliance behaviors* sub-construct cards sorts, of the three total items (a) If the owners of a website asks me not to do something, I will not do it, (b) If the owners of a website ask me to do something, I will to do it, and (c) If the makers of a technology ask me not to do something, I do not do it, 100% were placed correctly by at least 75% of participants. No card items were removed from this sub-construct.

There are no sub-constructs associated with the Affective primary construct. Consequently, no card sort was conducted in this phase of the research.

5.2 Focus groups and expert consultation

After individual items in the self-assessment questionnaire were edited as a result of the card sort described in section 5.1, three focus groups were conducted to assess the clarity of the version of the questionnaire. I met with two researchers between the second and third focus groups to review the findings of the first two and get feedback on my plans to address the issues. Highlights from each of the focus groups and meetings with the researchers are described below.

First focus group

The first focus group had four participants. The average time spent incarcerated was 11 years. The average age of the participants was 33 years old. They spent an average of 22 minutes completing the questionnaire. See Table 5.15.

Table 5.15: First focus group statistics

Participant No.	**Time spent (minute)**	**Gender**	**Age**	**Length of Incarceration (years)**
002	25	Male	23	4
003	30	Male	39	22

004	28	Female	39	22
005	28	Male	31	10

The first issue identified by focus group participants dealt with the rating scale in the affective section of the questionnaire. The presentation of the scale confused some participants. For example, some participants did not realize that they were supposed to select a value for each of the six feeling pairs presented. See Figure 5.1. Several recommendations were made about how to make it easier to understand. One recommendation was to extend the scale across the width of the page instead of condensing the selection choices on the right-hand side. Another issue that participants noted was their uncertainty regarding how they should respond when they did not identify with any of the feelings for a given feeling pair. Some did not engage in the activity being asked about, for example, searching the Internet; others stated that the options did not represent their feelings as experienced. It was recommended that a *Do not know/not sure* category be included.

Figure 5.1: Initial version of affective questions scale

117.	How do you feel about participating in discussions on the Internet?

Confused										**Sure**
5	4	3	2	1	0	1	2	3	4	5
Frustrated										**Encouraged**
5	4	3	2	1	0	1	2	3	4	5
Afraid										**Fearless**
5	4	3	2	1	0	1	2	3	4	5
Anxious										**Unworried**
5	4	3	2	1	0	1	2	3	4	5
Unconfident										**Confident**
5	4	3	2	1	0	1	2	3	4	5
Displeased										**Satisfied**
5	4	3	2	1	0	1	2	3	4	5

Participants were also confused about the beginning and ending of sections. For example, a few participants thought that the section asking about technology use “in classes” and “outside of classes” was referring to the same context of use until re-reading the sections. All participants agreed that the inclusion of definitive start and end markers would mitigate confusion. See Figure 5.2and Figure 5.3. It was also recommended that both section headings and questions clarify the type of setting being asked about.

Figure 5.2: Initial section header

Questionnaire

TECHNOLOGICAL

Instructions: Read each item and put a checkmark in the box that matches your response.

		Never									Without a doubt
		0	1	2	3	4	5	6	7	8	9	10
1.	Computers and laptops exist.											
2.	I have heard about smartphones.											
3.	The Internet exists.											
4.	Social media sites exist.											
5.	I am aware that files can be downloaded from the Internet.											
6.	I am aware that digital technologies have security settings.											
7.	It is possible to buy things on the Internet.											
8.	I know what things computers and laptops are good at doing.											
9.	I know what things smartphones are good at doing.											
10.	I know the difference between operating systems and software applications.											
11.	I know the difference between a cellular network and Wi-Fi network.											
12.	I know how to troubleshoot technology issues.											
13.	I know what a mouse is.											
14.	I know what keyboard shortcuts are.											
15.	I know what a private window in an Internet browser (Chrome, Internet Explorer, Safari, etc.) is.											
16.	I know what the back and forward buttons in an Internet browser are used for.											
17.	I know what Internet browser bookmarks are used for.											
18.	I know how to find the security settings on a digital device.											
19.	I can use a computer mouse.											
20.	I can use keyboard shortcuts.											
21.	I can open a private window in an Internet browser.											
22.	I can use the back and forward buttons in an Internet browser.											
23.	I can use bookmarks in my Internet browser.											
24.	I can download files from the Internet.											
25.	I can change security settings on a digital device.											
26.	I can buy things on the Internet.											

Questionnaire

Instructions: Read each item and put a checkmark in the box that matches your response.

		Never									Without a doubt
		0	1	2	3	4	5	6	7	8	9	10
27.	I can make changes in files (for example a document, a presentation, a spreadsheet, and a video).											
28.	I can save files.											
29.	I can save emails on the Internet.											
30.	I can fill out forms on the Internet.											
31.	I can figure out what to do if a digital device is frozen											
32.	I can troubleshoot problems with digital technologies.											
33.	I can find out what is wrong with my digital technologies when they are not working.											
34.	I can fix my digital device if it stops working.											
35.	I can fix basic technology issues with information I find.											
36.	I can sync information between multiple devices.											
37.	I use digital technology to help me remember things.											
38.	I use digital technology to do calculations.											
39.	I use digital technology to look up information.											
40.	I use digital technology to fix words I spell wrong.											
41.	I use digital technologies to remember birthdates.											
42.	I use digital technologies to remind me to do things.											
43.	I use digital technologies to remind me about my appointments.											
44.	I use digital technologies to get to (places I shop) stores.											
45.	I use digital technologies to get to appointments.											
46.	I use digital technologies to get to events.											
47.	I use digital technologies to get to meetings.											

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Figure 5.3: Revised header based on focus group feedback

Booklet No. _____

TECHNOLOGICAL

Instructions: Read each item and put a checkmark in the box that matches your response.

		Never									Without a doubt
		0	1	2	3	4	5	6	7	8	9	10
1.	Computers and laptops exist.											
2.	I have heard about smartphones.											
3.	The Internet exists.											
4.	Social media sites exist.											
5.	I am aware that files can be downloaded from the Internet.											
6.	I am aware that digital technologies have security settings.											
7.	It is possible to buy things on the Internet.											
8.	I know what things computers and laptops are good at doing.											
9.	I know what things smartphones are good at doing.											
10.	I know the difference between operating systems and software applications.											
11.	I know the difference between a cellular network and Wi-Fi network.											
12.	I know how to troubleshoot technology issues.											
13.	I know what a mouse is.											
14.	I know what keyboard shortcuts are.											
15.	I know what a private window in an Internet browser (Chrome, Internet Explorer, Safari, etc.) is.											
16.	I know what the back and forward buttons in an Internet browser are used for.											
17.	I know what Internet browser bookmarks are used for.											
18.	I know how to find the security settings on a digital device.											
19.	I can use a computer mouse.											
20.	I can use keyboard shortcuts.											
21.	I can open a private window in an Internet browser.											
22.	I can use the back and forward buttons in an Internet browser.											
23.	I can use bookmarks in my Internet browser.											
24.	I can download files from the Internet.											
25.	I can change security settings on a digital device.											
26.	I can buy things on the Internet.											

Booklet No. _____

TECHNOLOGICAL - CONTINUED

Instructions: Read each item and put a checkmark in the box that matches your response.

		Never									Without a doubt
		0	1	2	3	4	5	6	7	8	9	10
27.	I can make changes in files (for example a document, a presentation, a spreadsheet, and a video).											
28.	I can save files.											
29.	I can save emails on the Internet.											
30.	I can fill out forms on the Internet.											
31.	I can figure out what to do if a digital device is frozen											
32.	I can troubleshoot problems with digital technologies.											
33.	I can find out what is wrong with my digital technologies when they are not working.											
34.	I can fix my digital device if it stops working.											
35.	I can fix basic technology issues with information I find.											
36.	I can sync information between multiple devices.											
37.	I use digital technology to help me remember things.											
38.	I use digital technology to do calculations.											
39.	I use digital technology to look up information.											
40.	I use digital technology to fix words I spell wrong.											
41.	I use digital technologies to remember birthdates.											
42.	I use digital technologies to remind me to do things.											
43.	I use digital technologies to remind me about my appointments.											
44.	I use digital technologies to get to (places I shop) stores.											
45.	I use digital technologies to get to appointments.											
46.	I use digital technologies to get to events.											
47.	I use digital technologies to get to meetings.											

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Focus group participants identified problems regarding demographic questions. They felt important custodial relationships an individual may have with the Department of Corrections were absent from the questionnaire. Participants said this was significant because the type of custodial relationship influenced what technologies individuals had access to. They also stated that the questionnaire did not ask about educational opportunities available to incarcerated people. The inclusion of such questions would provide a clearer picture of the knowledge, ability and expertise individuals had attained while formerly incarcerated.

Second focus group

The second focus group had three participants. The average amount of time spent incarcerated was 18 years. The average age of the participants was 33 years old. They spent an average of 25 minutes completing the questionnaire. See Table 5.16.

Table 5.16: Second focus group session statistics

Participant No.	Time spent (minute)	Gender	Age	Length of Incarceration (years)
001	25	Male	38	12
006	15	Female	38	.5
007	35	Female	59	42

Several participants in the second focus group were confused about how to complete the affective section of the questionnaire. Participants said the presentation of the scale made it difficult to understand. For example, one participant was unsure what to do if they did not identify with the feelings on either end of feeling pair. Another participant interpreted the six feeling pairs to be one. Similar to the first focus group, participants commented that making the formatting more consistent would make it easier to complete the questionnaire.

Consultations

The first consultation was conducted with an Educational Measurement and Statistics expert having 10 years of experience in the field, and her colleague in training. I began the consultation with a description of the series of card sorts conducted in Part One of the dissertation research. I then discussed the purpose and format of the focus groups. Lastly, I provided them with both the findings of the first two focus groups and a copy of the EDL self-assessment questionnaire.

After spending approximately 10 minutes looking over the questionnaire, the consultants identified issues and proposed ways to address them. For the affective section, they recommended adding a visual indicator to signal participants that they were expected to mark a response for each feeling pair. The addition would also increase the consistency of presentation between sections. I implemented this recommendation by adding a letter to identify the feeling pair occupying each row; adding the word neither at the “0” point on the scale; and, extending the scale across the width of the page. See Figure 5.4.

Figure 5.4: Modified based on feedback from focus group participants and researchers

114.	How do you feel about finding files on a digital device?												
		5	4	3	2	1	0 Neither	1	2	3	4	5	
a.	Confused												Sure
b.	Frustrated												Encouraged
c.	Afraid												Fearless
d.	Anxious												Unworried
e.	Unconfident												Confident
f.	Displeased												Satisfied

The second consultation was held with a research scientist. I began the consultation with a description of the series of card sorts conducted in Part One of the dissertation research. I then discussed the purpose and format of the focus groups. Lastly, I provided her with both the findings of the first two focus groups and a copy of the EDL self-assessment questionnaire.

Upon examination of the questionnaire, the research scientist recommended adding questions to diversify analyses and increase the interpretive potential of data collection. For example, adding questions that focused on time would allow me to detect any temporal dependencies between the percentage of the correct placement of items into the four primary constructs and the length of time participants had engaged in particular activities indicated by the items prior to or during former incarceration; or, provide me with information about the level of effort expended by participants to satisfy objectives e.g., the number of modifications of search terms typically needed to retrieve useful results. The consultation also revealed that given the present state of the questionnaire, it would be difficult to discover other factors that might influence participants' digital literacy levels. The inclusion of open-ended questions was recommended. The following questions were added in order to implement the recommendation:

1. What have you been doing to learn about digital technologies?
2. Is there anything prisons can do to help people prepare to use digital technologies in the community?

I also added the following multi-choice question:

- In the last two-months by what means have you learned about how to use digital tools.

Regarding data collection, the research scientist stated that formerly incarcerated people who participated in programming prior to their return to society or during the first weeks after returning to the community might answer significantly different from participants who did not. She stated that differential access to contraband technology could lead to similar results. The research scientist also recommended diversifying the data collection location to include formerly incarcerated people who were not under corrections supervision, and did not participate in programming e.g., a transitional housing program offered by community-based service providers. To address this recommendation, I invited participants using flyers customarily posted at grocery stores and community centers i.e., the types of places people who are not under corrections supervision and not participating in programming would be likely to go.

Third focus group

After the consultations with researchers, I held a final focus group. The third focus group had five participants. The average amount of time incarcerated was 6 years. The average age of the participants was 49.5. Participants spent an average of 30 minutes completing the questionnaire. See Table 5.17 .

Table 5.17: Third focus group session statistics

Participant No.	Time spent (minute)	Gender	Age	Length of Incarceration (years)
008	30	Male	58	30.5
009	36	Male	25	1 mon
010	20	Male	48	6 mon
011	40	Male	67	11 mon
012	24	Female	unknown	2 mon

The participants stated that the instructions included in the questionnaire were clear. One mentioned that they would have appreciated more traditional Likert scale with five points, starting with "definitely agree" and ending with "definitely disagree." Although all participants understood that there were six feeling pairs in the affective section, some participants found the updated scale to be confusing. Two participants stated that they considered selecting one option on each side of the scale. They recommended changing the numerical labels along the top of the scale to reflect the structure of labels in other sections. The participants' feedback led me to make the following changes:

1. I changed the scale from -5 to 5 to 0 – 10
2. I tweaked the feeling pair labels by adding "completely" to the beginning for each of the feeling pair

5.3 EDL Questionnaire

The self-assessment questionnaire was completed by 36 participants. The average age of participants was 44 years old. Eighty-nine percent (32) identified as male, and 11% (4 people) as female. Eighty percent of participants identified as being either African American or White; 33% African American and 47% white. All formerly incarcerated participants were returning to cities in King County including, Des Moines, SeaTac, Seattle and Tukwila. Participant spread across several generations.[1]

Eight participants (22%) were young adults (18-35 years), 22 participants (61%) were middle-aged adults, ages ranging between 36 and 55 years, and 6 participants (17%) were older adults, aged older than 55 years.

[1] Customer Demographics – Age Demographics for Advertising https://marketingartfully.com/customer-demographics-age-demographics-for-advertising/

At the time of incarceration 14% of participants had not completed any educational program, 28% had completed grade school, 33% had a high school or general education diploma, 6% had an associate's degree, 17% had completed some college, and 2% had a higher college degree (e.g., bachelor's, master's).

During incarceration 33% did not complete an educational program, 25% received a high school or general education diploma, 6% completed their associate degree, 24% participated in some college education, and 11% received a certificate for participating in an education program.

Since returning to the community, 89% have not participated in any educational programming and 11% have taken college classes or completed a certificate program.

Research participants spent between 1 and 22 years incarcerated. Fifty-eight percent (21 ppl) of participants had spent between 1 – 5 years incarcerated; 17% (6 ppl) between 6 – 10 years incarcerated; 19% (7 ppl) between 11 – 15 years incarcerated; 3% between 16 – 20 years incarcerated; 3% (2 ppl) more than 20 years incarcerated.

At the time of completing the questionnaire, 69% of participants (25 ppl) had been in the community for less than 31 days. Eleven percent of participants had been in the community for more than 30 days but less than 60; Eight percent more than 60 days but less than 90; Eight percent for more than 60 days but less than 90; and, 11% for more than 90 days.

Over half of all participants completed the questionnaire within 30 minutes. Six percent (2 ppl) of participants completed the questionnaire within 15 minutes. Fifty-eight percent (21 ppl) spent over 15 minutes, but not more than 30 minutes completing the self-administered questionnaire. Thirty-six percent (13 ppl) of participants took longer than 30 minutes to complete the questionnaire.

To measure the overall reliability of the data collected using the Everyday Digital Literacy Assessment Questionnaire, Cronbach's Alpha was used on each of the four primary constructs at the end of the data collection process. The results of Cronbach's Alpha test, Table 5.18, demonstrated that the items in each of the four primary constructs possessed a high level of internal consistency.

Table 5.18: Cronbach's alpha by construct

Construct	Cronbach's Alpha (standardized)	# of Items
Technological	.971	47
Cognitive	.947	32
Social Behavioral	.960	31
Affective	.989	54

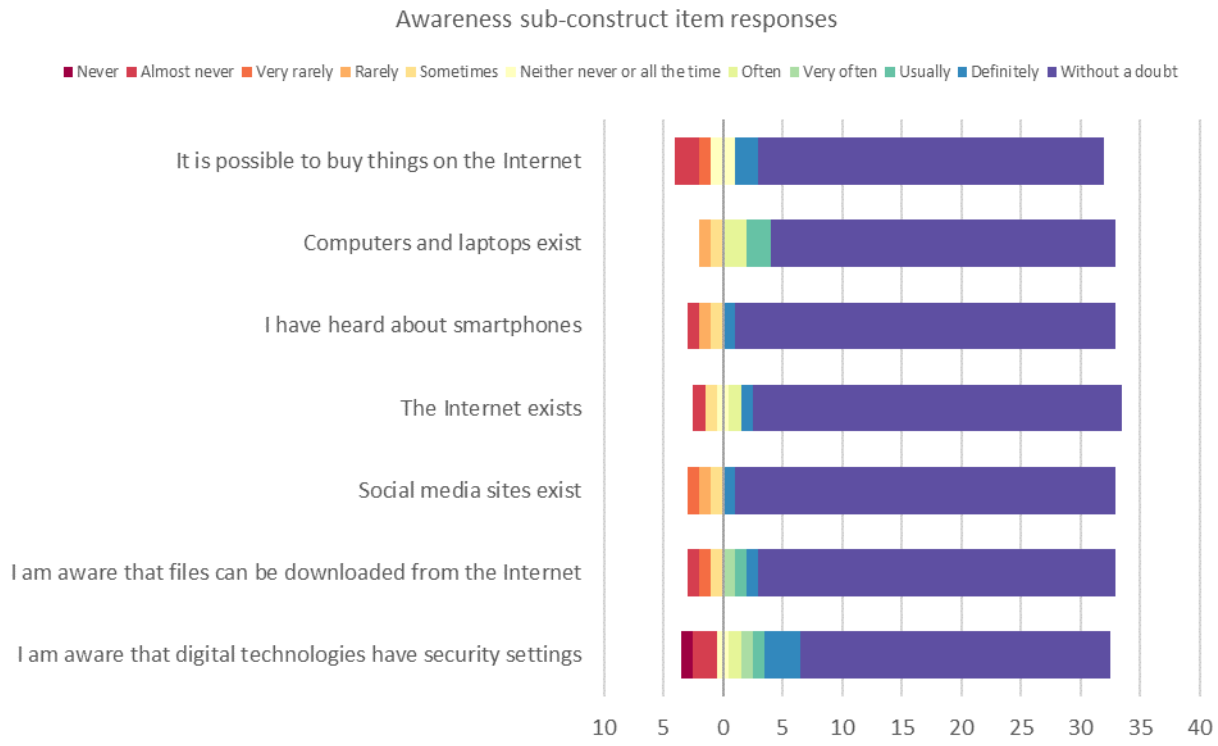
Technological construct results

Awareness sub-construct

Although technology is largely inaccessible to the incarcerated, nearly all participants were aware of the existence of digital tools and digital spaces. Of the seven items total in the awareness sub-construct (see Figure 5.5) more than 84% of participants selected responses closer or equal to "without a doubt," ;

indicating they are aware of the existence of technological artifacts e.g., laptops, the Internet, and smartphones that are symbolic and crucial in the digital landscape.

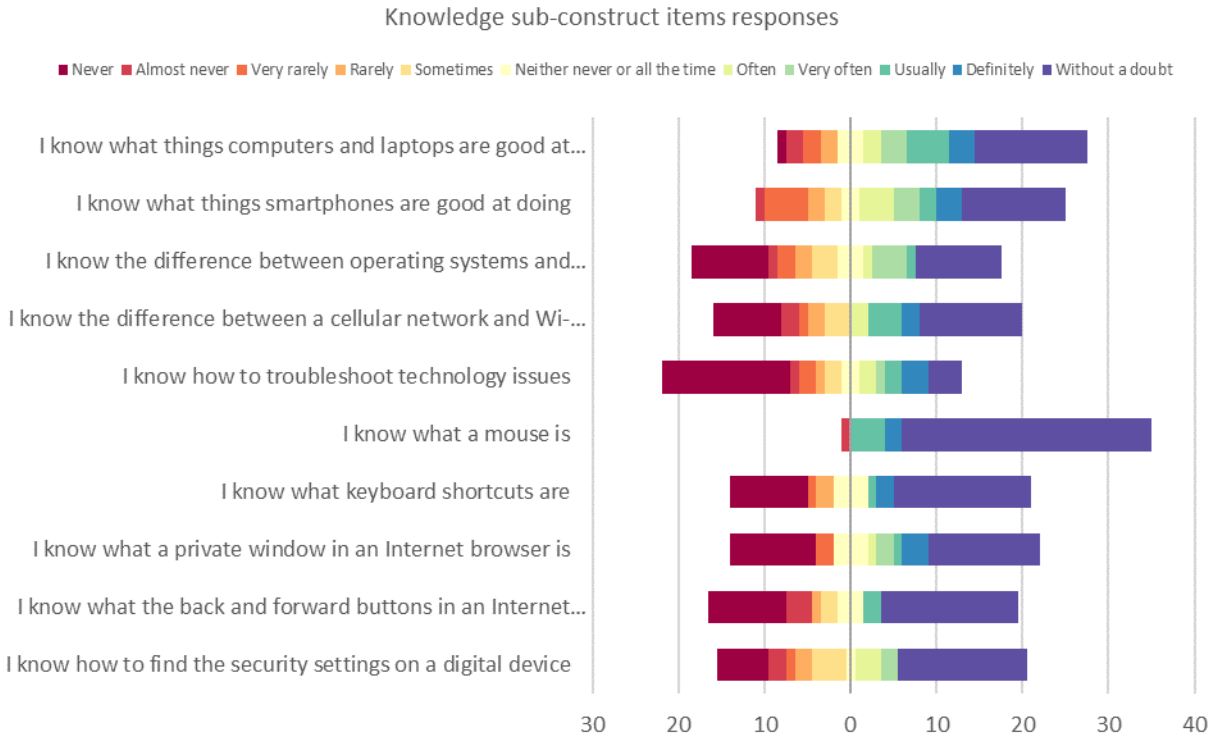
Figure 5.5: Responses to Awareness sub-construct items (n = 36)



Knowledge sub-construct

Over half of participants have knowledge about artifacts used to engage in digital spaces but little to none regarding troubleshooting. Of the 1 one items total in the knowledge sub-construct (See Figure 5.6), participants rated themselves as knowing (6 or higher) on eight items. The latter addressed knowledge of different components of digital devices, and how they worked. The number of participants who selected responses closer or equal to "never" was equal to those that selected responses closer to or equal to "without a doubt" for two items (1) I know the difference between operating systems and software applications and (2) I know what Internet browser bookmarks are items used for. The item, I know how to troubleshoot problems received the lowest individual and average rating.

Figure 5.6: Responses to Knowledge sub-construct items (n = 36)



Capabilities sub-construct

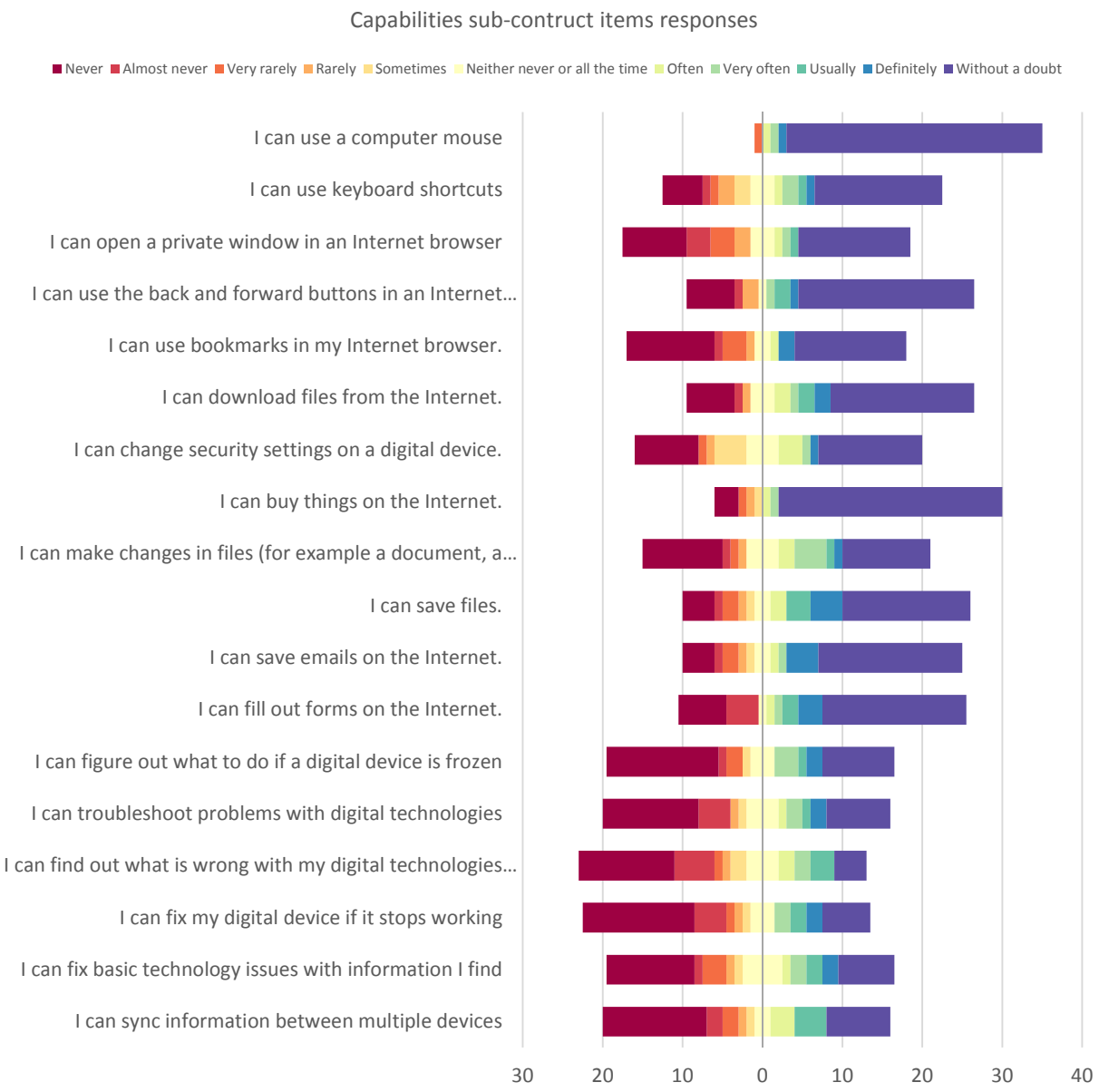
The EDL self-assessment questionnaire demonstrated that most participants struggle when it comes to carrying out tasks with digital devices and in digital spaces. Of the 17 items total in the capability sub-construct (See Figure 5.7) participants rated themselves as being closer or equal to "without a doubt" as it relates to carrying out activities such as interacting with different parts of an Internet browser, e.g., forward/back button navigation, and engaging in activities using an Internet browser, indicated by 41% of items (7 items).

The EDL self-assessment questionnaire demonstrated that most participants struggle when it comes to carrying out tasks with digital devices and in digital spaces. Of the 17 items total in the capability sub-construct (Figure 8) participants rated themselves as being closer or equal to "without a doubt" as it relates to carrying out activities such as interacting with different parts of an Internet browser, e.g., forward/back button navigation, and engaging in activities using an Internet browser, indicated by 41% of items (7 items).

Participants rated themselves more often as being closer or equal to "never" as it relates to their capability to execute higher level activities indicated on seven items; including opening private windows in an Internet browser (19 of 34), figuring out what do to if a digital device freezes (20 of 34), troubleshooting problems with digital devices (19 of 34), finding out what is wrong with digital technologies when they are not working (23 of 34), fixing digital devices (22 of 34), using available information to resolve technology issues (20 of 34), and syncing information between devices (20 of 34) (See Figure 5.7).

There were two items among the 17 where the number of participants who selected responses closer or equal to "never" was equal to those that selected responses closer to or equal to "without a doubt." These two items: 1 - *I can use bookmarks in my Internet browser* and 2 - *I can change security settings on a digital device.*

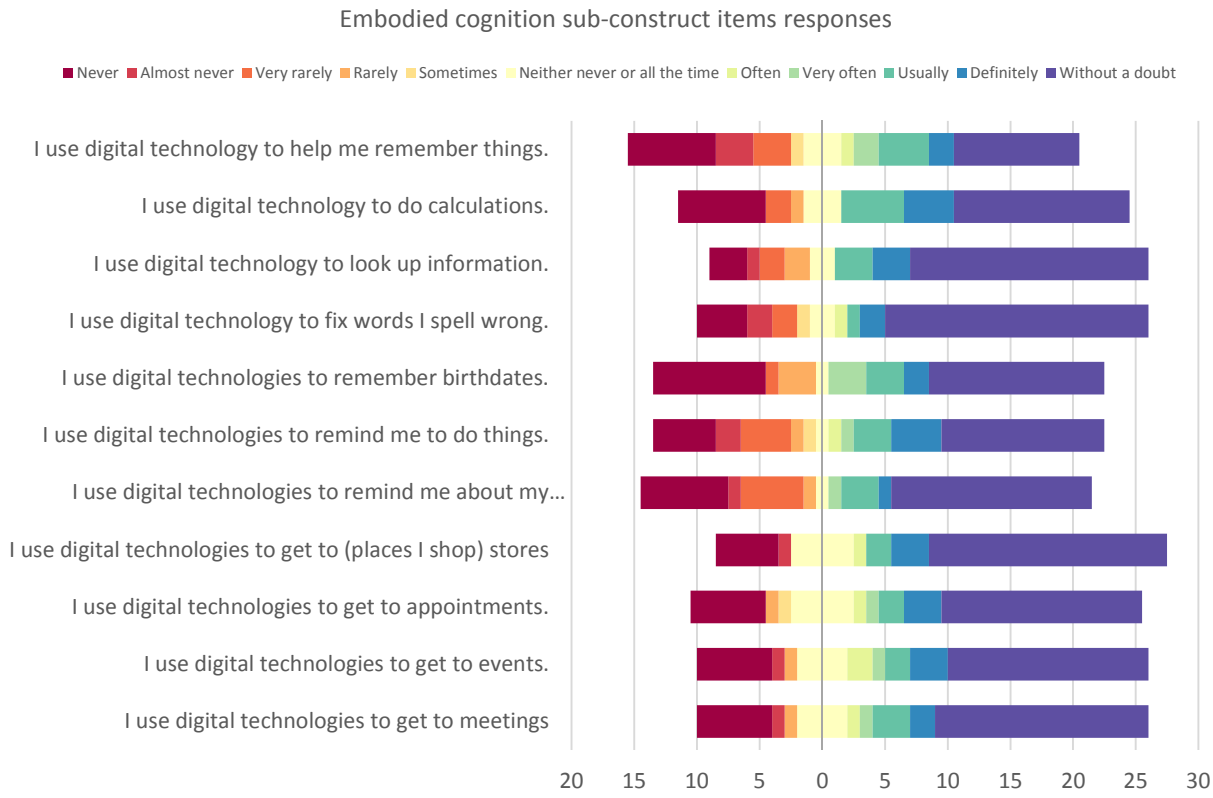
Figure 5.7: Responses to Capabilities sub-construct items (n = 36)



Embodied cognition sub-construct

More than half of participants are using technologies to augment cognitive tasks. Of the 11 total items in the embodied cognition sub-construct (See Figure 5.8) over half of participants rated themselves as closer or equal to "without a doubt" relative to using digital technologies to carry out cognitive related tasks on all questions.

Figure 5.8: Responses to embodied cognition sub-construct items (n = 36)



Cognitive construct results

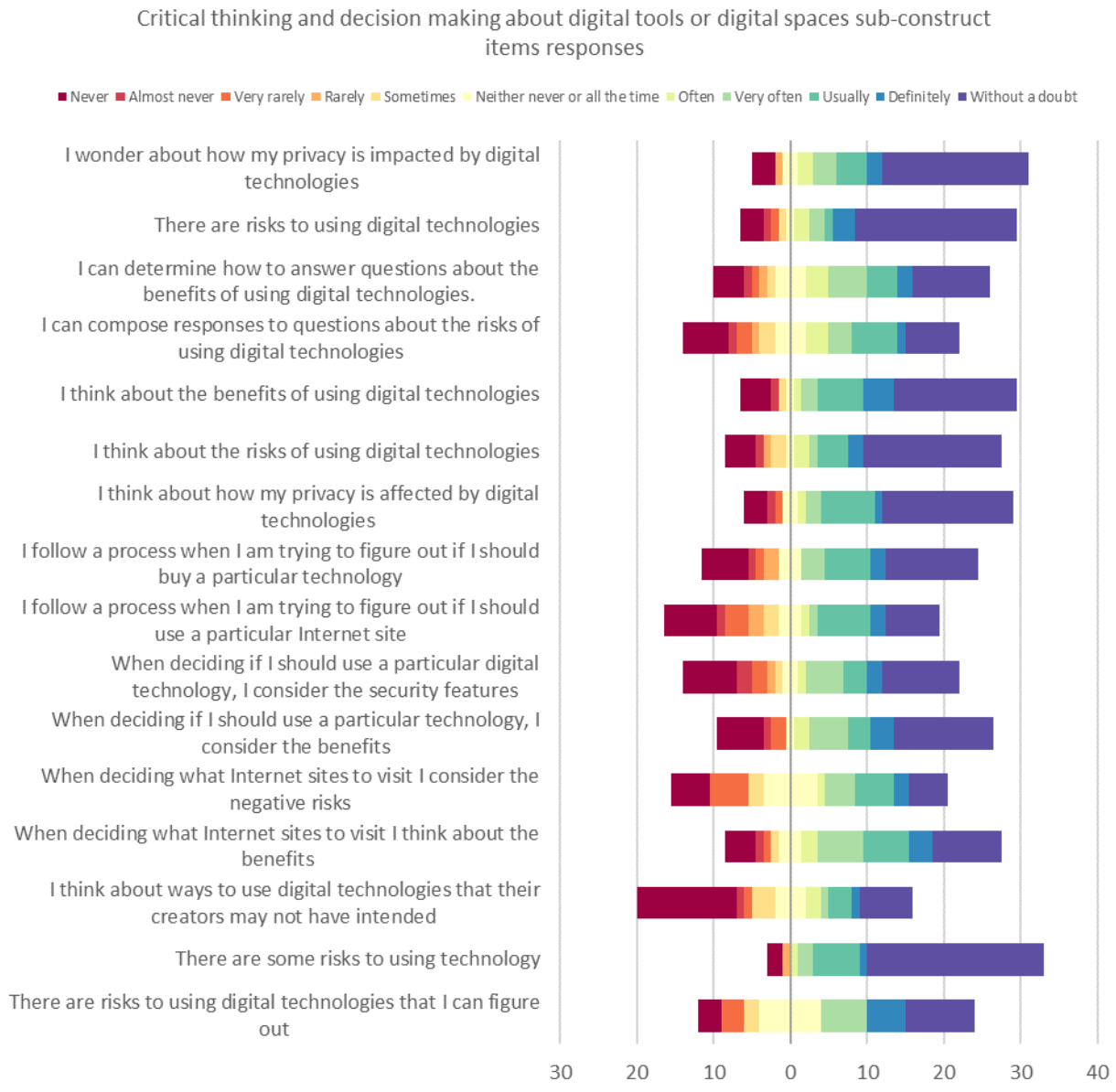
Critical thinking and decision making about digital tools and digital spaces sub-construct

Most participants are cognizant that there are benefits and risks to using digital technologies and digital spaces (see Figure 5.9). Interestingly, participants rate the application of deliberative, evaluative, and risk assessment behaviors surrounding their everyday use and of digital tools and spaces, such as *following processes …*, somewhat lower. For example, only half of participants actively think about the negative risks of using and navigating Internet sites. Of the 14 items total in critical thinking and decision making about digital tools and digital spaces sub-construct approximately 80% of participants rated themselves as closer or equal to "without a doubt" relative to 1 one items (1) *I wonder about how my privacy is impacted by digital technologies,* (2) *There are risks to using digital technologies*, (3) *I can determine how to answer questions about the benefits of using digital technologies,* (4) *I can compose responses to questions about the risks of using digital technologies,* (5) *I think about the benefits of using digital technologies*, (6) *I think about the risks of using digital technologies*, (7) *I think about how my privacy is affected by digital technologies*, (8) *I follow a process when I am trying to figure out if I should buy a particular technology*, (9) *When deciding if I should use a particular digital technology, I consider the security features,* (10) *When deciding if I should use a particular technology, I consider the benefits*, and (11) *When deciding what Internet sites to visit I think about the benefits.*

A little over half of all participants, 52.9%, rated themselves as closer or equal to "without a doubt" relative to *following a process when deciding to use a particular website*; 50% of participants rated

themselves as close or equal to "without a doubt" relative to *when deciding what Internet sites to visit I consider the negative risks;* 60% of participants rated themselves as close or equal to "never" relative to *when it comes to using digital technologies in ways their creators may not have intended*.

Figure 5.9: Responses to critical thinking and decision making about digital tools or digital spaces sub-construct items (n = 36)



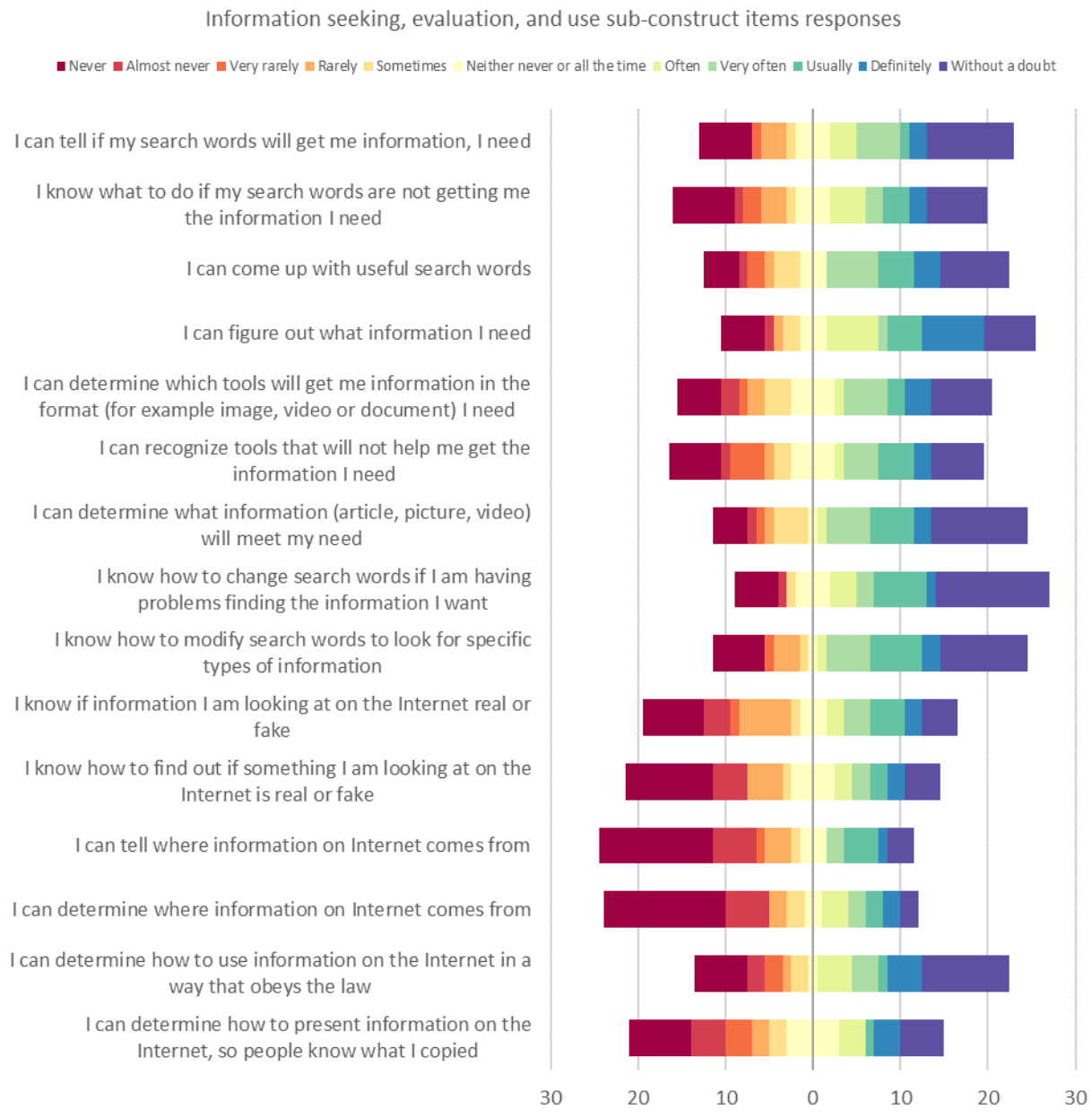
Information seeking, evaluation, and use sub-construct

Most participants can initiate searches; evaluation and use are more difficult. Most participants are less able to discern the reliability of content available on the Internet. Also, they do not know how to disclose the source of the information to others (See Figure 5.10).

Four items in the *Information seeking, evaluation, and use* sub-construct address information seeking (1) *I can tell if my search words will get me information I need*, (2) *I can come up with useful search words*,

(3) *I know how to change search words if I am having problems finding the information I want*, and (4) *I know how to modify search words to look for specific types of information*. Most participants rated themselves as being close or equal two "without a doubt" relative to these activities. Slightly more participants indicated knowing how to modify search words than being able to brainstorm useful search words.

Figure 5.10: Responses to Information seeking, evaluation, and use sub-construct items (n = 36)



Of the 16 items total in the *information seeking, evaluation and use* sub-construct, four items asked participants to select a point on the scale that represent their abilities identify the source of information found on the internet as a means of determining its authenticity and trustworthiness. Between 55% and 71% of participants rated themselves as being close or equal to "never" being able to carry out such

tasks. More people rated themselves as being closer to unable to identify the source and authenticity of information than those who could.

Three of the 16 items addressed *evaluation*, i.e. the abilities to diagnose information needs and identify tools that can help facilitate the discovery: (1) *I can figure out what information I need,* (2) *I can determine what information will meet my need*, and (3) *I can recognize tools that will not help me get the information I need.* Seventy percent of participants rated themselves as being close or equal to "without a doubt" to items 1 and 2. However, only 45% indicated that they could recognize tools that *could not* help them to address their need (Item 3).

Two of the 16 items addressed *use:* (1) *I can determine how to use information on the Internet in a way that obeys the law* and (2) *I can determine how to present information on the Internet in a way that obeys the law*. The responses to these questions were contradictory. Whereas 64% of participants rated themselves as being close or equal two "without a doubt" relative to item 1, the same percentage of individuals rated themselves as being close or equal two "never" relative to item 2. In other words, 64% of participants said they could figure out how to use information in a way that obeyed the law, and 64% said they did *not* know how to present information so people knew the source from which it had been copied.

Social behavioral construct

Peer relationship behaviors sub-construct

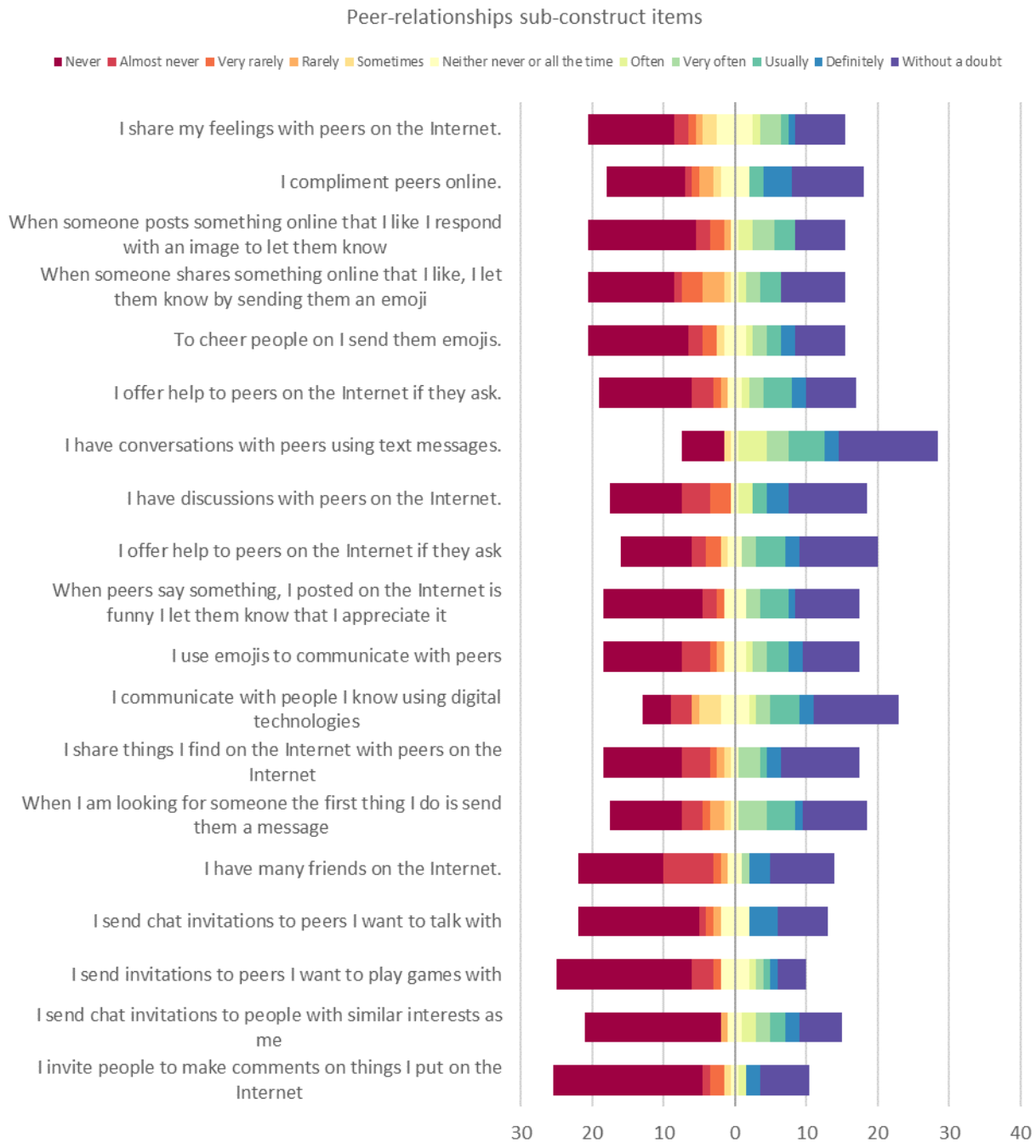
Participants seldom practice peer relationship behaviors in digital spaces. Of the 19 items total in the peer relationship behaviors sub-construct (Figure 13), 80% of participants rated themselves as being closer to equal to do "without a doubt" relative to only one type of peer relationship behaviors, i.e. texting. About 60% of participants indicated they communicate with people they know using digital technologies; 56% of participants reported they offer to help peers on the Internet if asked. Interestingly, when presented with the same question later in the questionnaire, the result dropped to 47%.

Between 50% and 73% of participants rated themselves as being closer to or equal to "never" on items indicating engagement with peer relationship behaviors in digital spaces. For ten items in the peer relationship sub-construct, over 56% of participants rated themselves as being closer or equal to

"never." : (1*) I share my feelings with peers on the Internet*, (2) *when someone posts something online that I like I respond with an image to let them know*, (3) *when someone shares something online that I like, I let them know by sending them an emoji*, (4) *to cheer people on I send them emojis*, (5) *when peers say something I posted on the Internet is funny I let them know that I appreciate it*, (6) *I have many friends on the Internet*, (7) *I send chat invitations to peers I want to talk with*, (8) *I send invitations to peers I want to play games with*, (9) *I send chat invitations to people with similar interests as me*, and (10) *I invite people to make comments on things I put on the Internet*.

Nearly half of participants rated themselves as being closer or equal to "without a doubt" on items relative to conducting a *Social behavioral* activity, while half rated themselves as being closer to "never." The five items include (1) *I complement peers online* , (2) *I have discussions with peers on the Internet*, (3) *I use emjoi's to communicate with peers*, (4) *I share things I find on the Internet with peers on the Internet*, and (5) *when I am looking for someone the first thing I do is send them a message*.

Figure 5.11: Responses to Peer-relationship sub-construct items (n = 36)



Self-management behaviors sub-construct

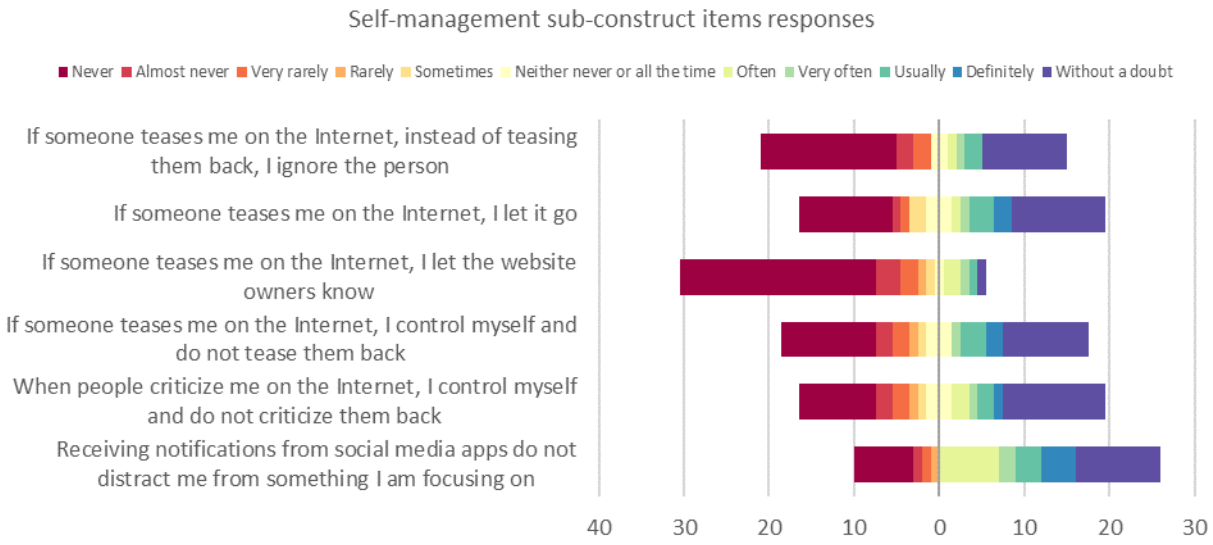
Of the six *Self-management* behaviors sub-construct total items (see Figure 5.12), 58% or more of participants rated themselves as being close or equal to "never" relative to items indicating engagement with instigative negative social interactions, including (1) *if someone teases me on the Internet, instead of teasing them back, I ignore the person* (20 of 34), (2) *if someone teases me on the Internet, I let the website owners know*, and (3) *if someone teases me on the Internet, I control myself and do not tease*

them back. Half of participants are not distracted by social media. Interestingly, although participants discourage invective social behaviors, they do not tell anyone about situations in which they were targeted.

On 2 similar items (1) *if someone teases me on the Internet, I let it go*, and (2) *when people criticize me on the Internet, I control myself and do not criticize them back,* half of participants rated themselves as being closer or equal to "without a doubt" while the other half rated themselves as being closer to "never".

With regards to *receiving notifications from social media apps do not distract me from something I am focusing on*, 56% of participants rated themselves as being closer or equal to "without a doubt". Eighteen percent of participants selected the middle point on the scale, indicating that they are not never distracted, but likewise there are not ever distracted all the time.

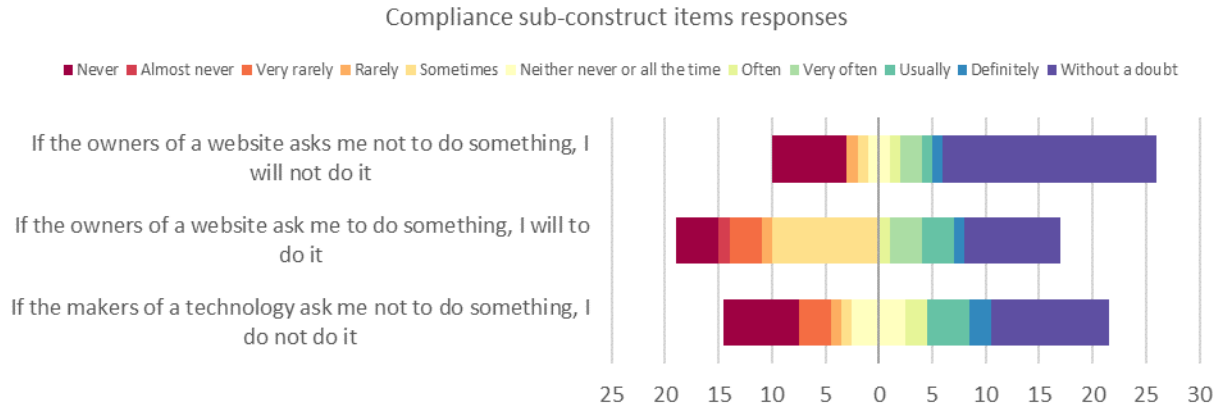
Figure 5.12: Responses to Self-management sub-construct items



Compliance behaviors sub-construct

Half of participants abide by rules in digital spaces. Of the 3 total items in the *Compliance behaviors* sub-construct (Figure 14), two asked participants whether they would do something that they were instructed not to do (1) *If owners of a website ask me not to do something, I will not do it*, (2) *If makers of a technology ask me not to do something, I do not do it.* Over 50% of participants indicated that they would comply with the requests. Interestingly, relative to a similar question, *if the owners of a website ask me to do something, I do it*, a slightly higher percentage of participants rated themselves as being closer or equal to "never," indicating they do not do what website owners ask. Tellingly, over a quarter of participants selected the middle point on the scale indicating that they “do not never do” what website owners ask, nor “do they always do” what website owners ask.

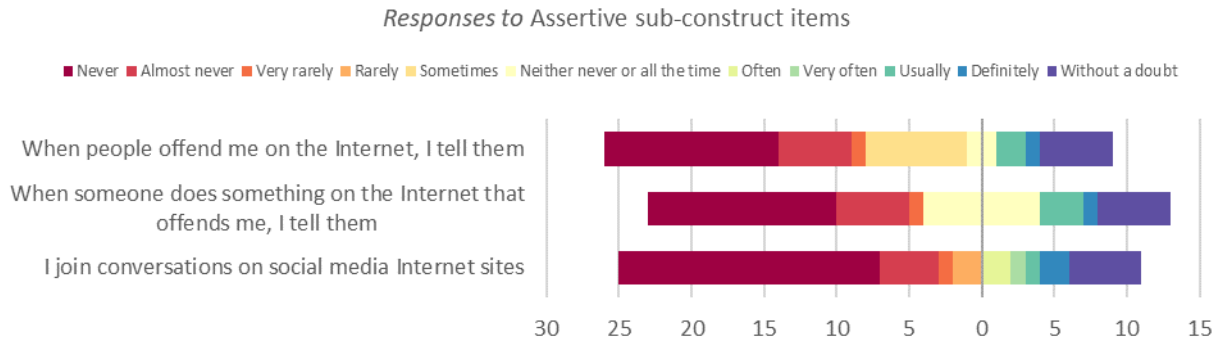
Figure 5.13: Responses to Compliance sub-construct items (n = 36)



Assertive behaviors

Approximately 2/3 of participants do not express feelings when wronged by others on a personal level. Two of the three items total in the *Assertive behaviors* sub-construct asked participants to indicate if they tell people who have offended them that they were offended. In both cases, almost 75% of participants rated themselves more often as being closer or equal to "never" relative to *speaking up*. Approximately 1/5 of participants selected the middle point on the scale relative to an offensive behavior per se: *When someone does something on the Internet that offends me, I tell them* (see Figure 5.14).

Figure 5.14: Responses to Assertion sub-construct items (n = 36)



Affective construct responses

Participants provided responses to nine *Affective* construct items (see Figure 5.15 through Figure 5.23). Each item was associated with six “feeling pair” scales. On the scale, points between 0 and 5 represent negative emotions typically found on negative emotion typologies.[2] Points between 6 and ten represent emotions typically found on the positive emotion typologies. Participants had to select a location on the “feeling pair” scale that indicated their feeling.

Of the nine items total in the *Affective* construct three items were located on the negative end of the feeling pair scale by most participants: (1) *How do you feel about finding files on a digital device?* (see

[2] Negative Emotion Typology https://emotiontypology.com/

Figure 5.18), (2) *How do you feel about understanding the rules of a website?* (see Figure 5.21), and (3) *How do you feel about sharing information with people on the Internet?* (see Figure 5.23). For only one feeling pair associated with the first and third items was the number of people who selected positive feeling was equal to or more than the number that selected negative feelings—slightly more than 50% of participants were fearless and less afraid of finding files on digital devices. Fifty percent felt confused about sharing information with people on the Internet while the other 50% felt sure. The second item received the greatest number of negative responses by participants. Every feeling pair had more negative responses than positive ones.

Figure 5.15: How do you feel about using digital devices to remember things?

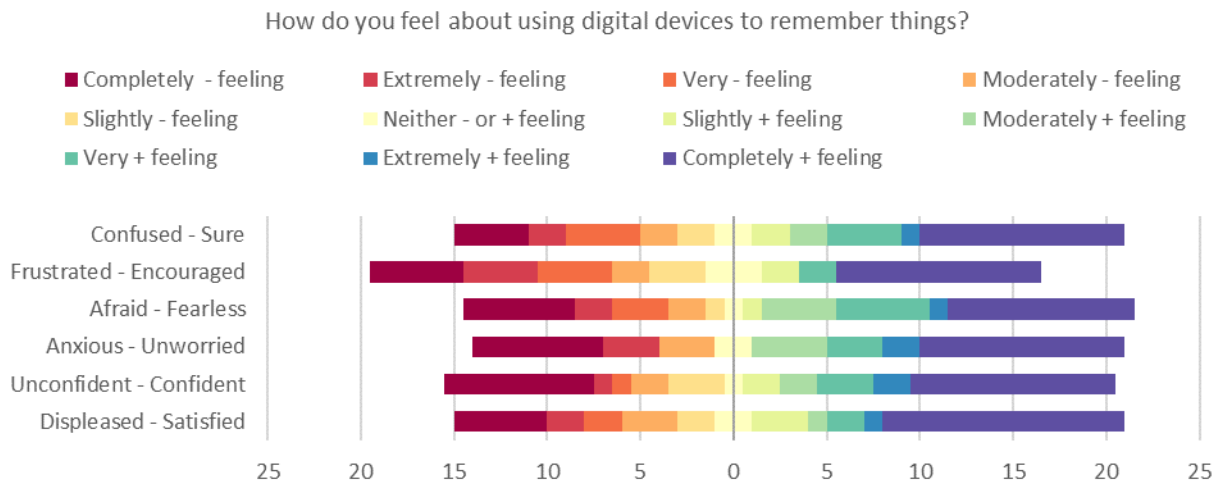


Figure 5.16: How do you feel about searching for information on the Internet?

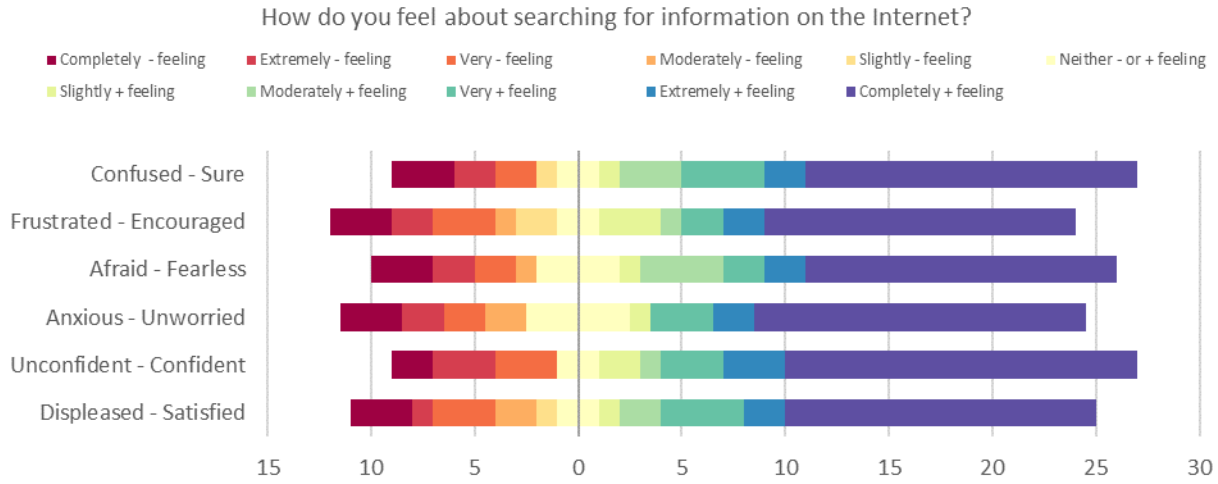


Figure 5.17: How do you feel about your choosing a trustworthy website for information?

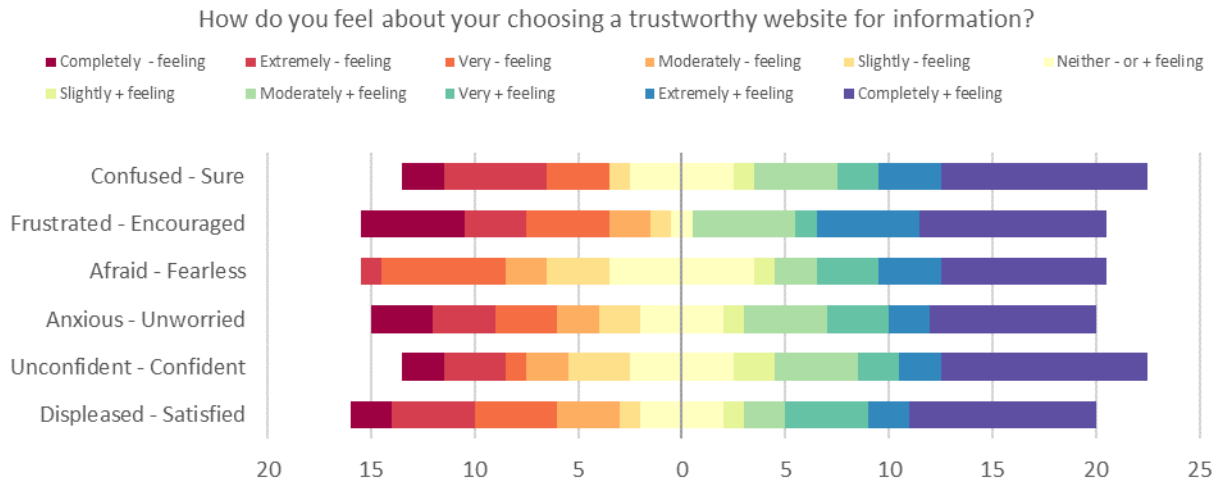


Figure 5.18: How do you feel about finding files on a digital device?

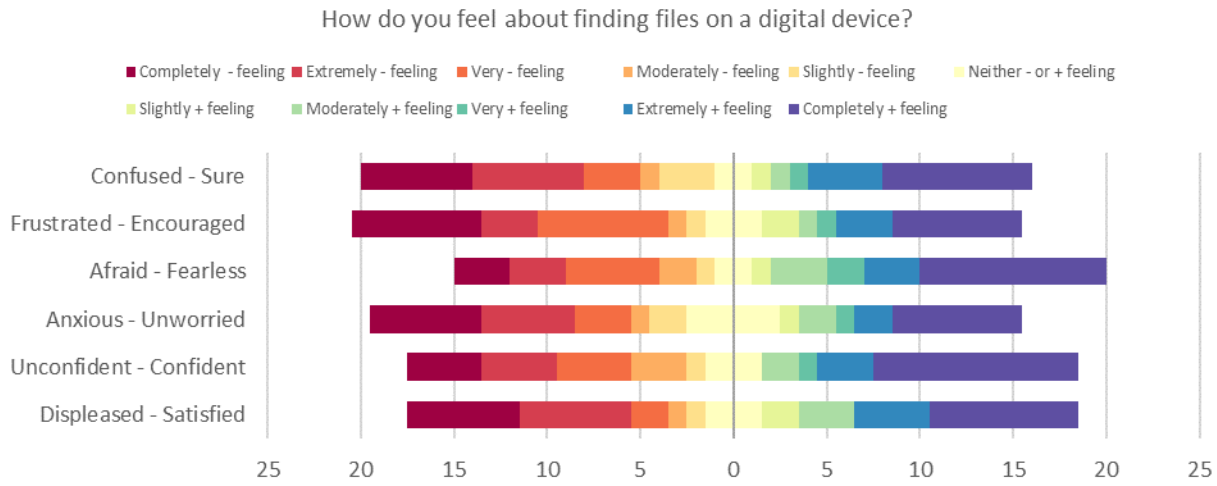


Figure 5.19: How do you feel about adjusting the security settings on a digital device?

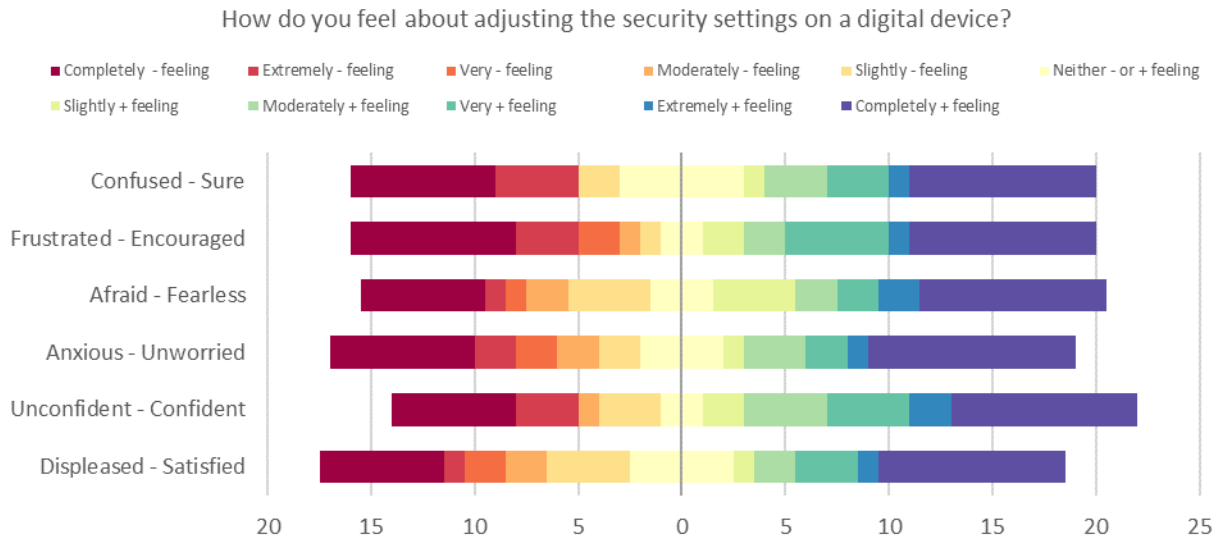


Figure 5.20: How do you feel about participating in discussions on the Internet?

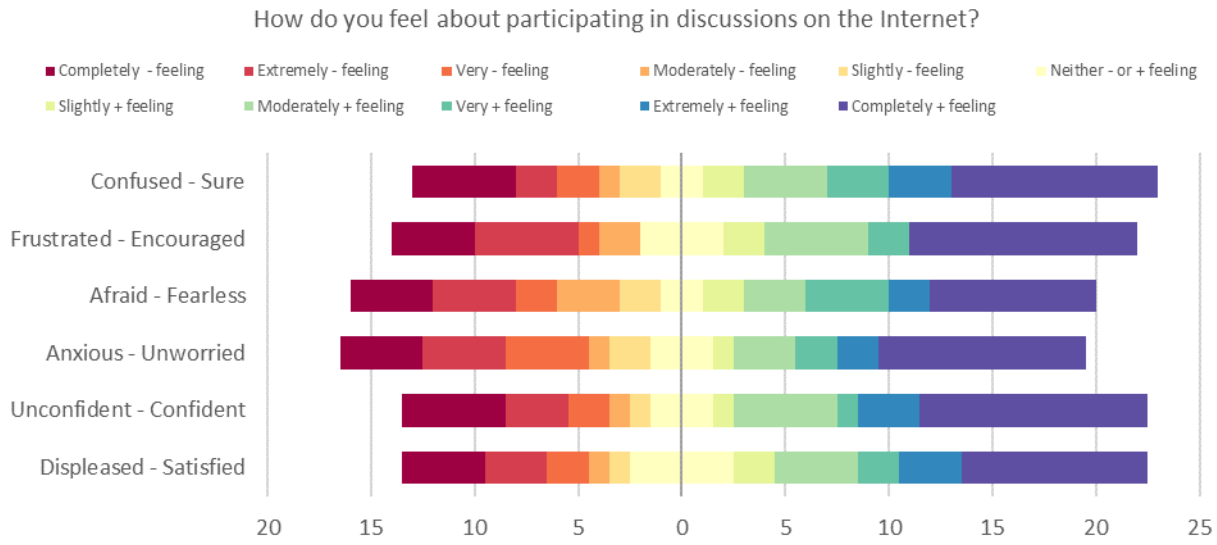


Figure 5.21: How do you feel about understanding the rules of a website?

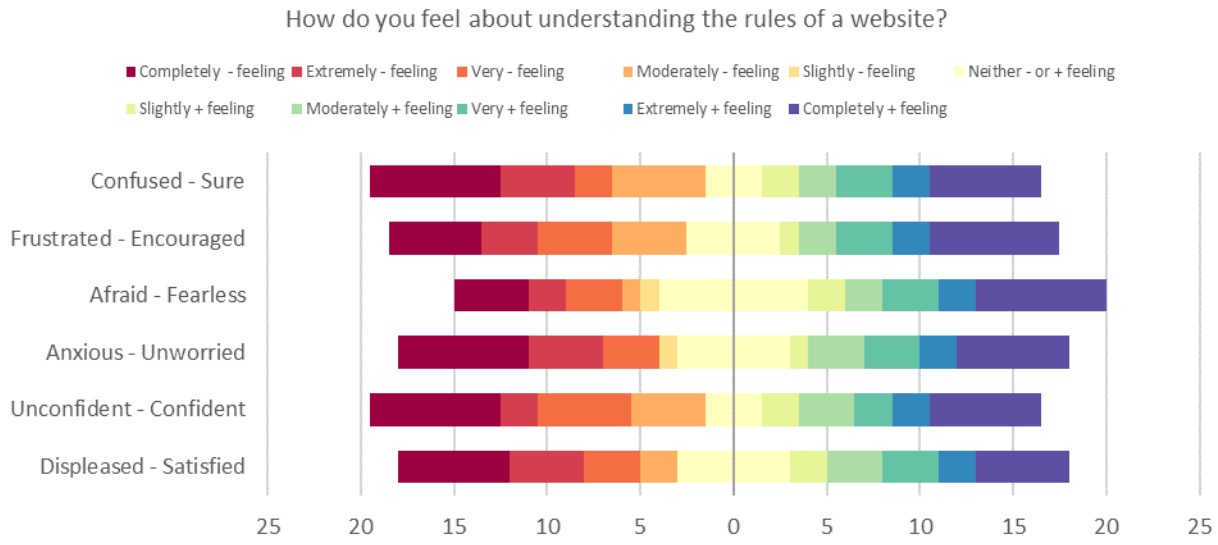


Figure 5.22: How do you feel about obeying the rules of a website?

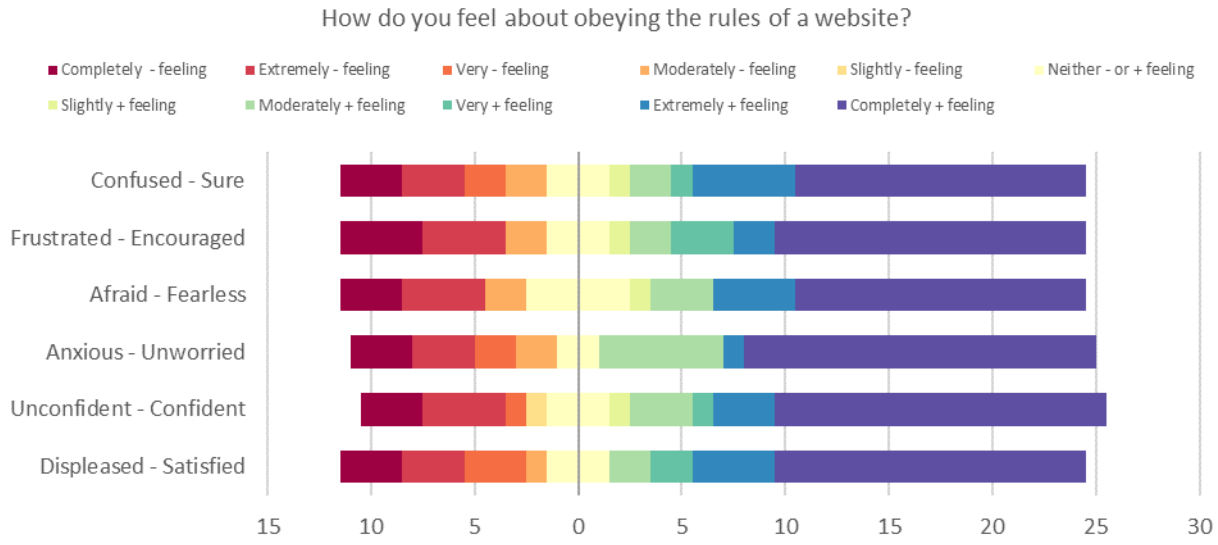
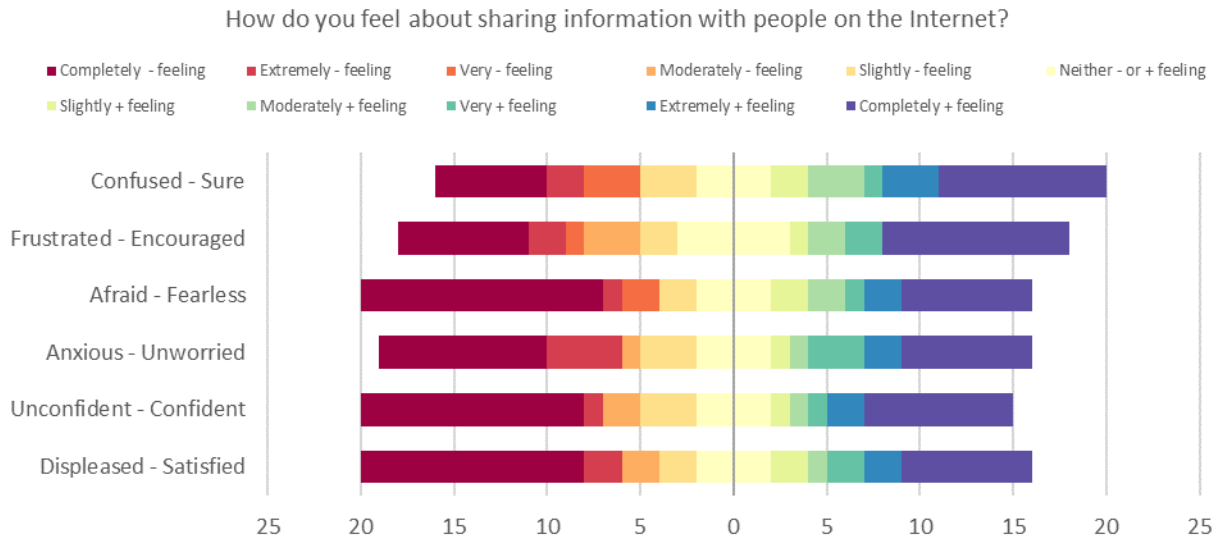


Figure 5.23: How do you feel about sharing information with people on the Internet?



5.4 Analysis

This research aims to move away from the limitations present in existing frameworks of digital literacy and present a holistic framework of everyday digital literacy. To accomplish this a series of card sorts were performed by information science professionals to refine items created through an intensive literature review. The research also aims to provide some insight into the everyday digital literacy levels of formerly incarcerated individuals. To accomplish this, formerly incarcerated individuals completed EDL self-assessment questionnaire. In this section, I examine and interpret the research findings presented earlier in this section.

Card sorting with information science professionals

A holistic everyday digital literacy framework should consist of at least four primary constructs. Results of the information professional participants' card sorts suggest that many of the construct items created are aligned with the four primary constructs—technological, cognitive, social behavioral and affective. However, there were items that participants did not place into the intended primary construct. For those items, this signaled a misalignment between the intention for items and how items were perceived by information professionals. As described in the results section, most discrepancies were resolved by asking participants clarifying questions and using the information to determine how to modify the text of an item.

Of all the constructs, sorting items into the *Social* behavioral sub-constructs presented the greatest challenge for information science professional participants. The importance of precise sub-construct labels and items was emphasized when participants were sorting items in to sub-constructs. Many participants indicated that construct label wording was the primary artifact they used to make placement decisions. Most participants read an items text, paused, scanned through sub-constructs, pausing at the first label that appeared to be a good fit. Some participants then immediately placed the item into the category and moved on to the next item. Other participants, after pausing scanned through the remaining labels to make sure to see if their gut instinct was most appropriate. If they saw another label they thought might qualify, they often quickly rescanned the item text and then settled.

These observations indicate that the card sorts required participants to be attentive and highlights the importance of carefully selecting construct labels.

While sorting items into sub-constructs, many information science professional participants situated items within their personal realities and used that information to interpret the text and decide where to place items.. This behavior was more visible while participants sorted sub-construct items. In one instance, while sorting into the technological construct four sub-constructs, a participant read the item, *the internet exists*, then paused and verbally affirmed that the Internet exist and that they use it. The participant went on to scan the construct labels and spent a few moment deciding whether to put the item in the awareness or knowledge sub-construct. In another situation when asked to define peer-relationship behaviors, a participant opened by saying, "So I feel like many of these cards have the word peer in them, but not all of them. And given my experiences and growing up without digital technologies…" In another situation when asked to explain how they arrived at their decision, the participant said, "I was thinking about myself going out there to learn something. How I use the Internet I suppose. So I am putting myself in this situation." These and other participant comments underline the importance individual's ascribe to their individual realities.

Even when Information science professional participants placement decisions did not align with other statements they made, the fell back on their personal interpretations to support their decision. In one situation, a participant defines inquiry and learning as "seeking out information that one needs." The participant then placed the items *I proactively join conversations with people on the Internet that I do not know* and *I proactively join conversations with people I do not know on social media sites*. Unclear about the relationship between the definition and the items, the facilitator, after pointing out the items do not mention anything related to seeking out information, asked the participant why the items were put in the sub-construct. The participant responded by saying that a person joining a conversation would be learning, even if it is about someone. When asked, if a person could join a conversation to teach, the participant agreed, but said they were not thinking about the two items in question in that way. This example demonstrates that the interpretation that participants ascribed to items were based on their personal realities.

Information science professional participants sought guidance and affirmation in making placement decisions. When placing an item that they were not sure about, participants turned to the facilitator. On some occasions, it was to get clarity on an item. In other instances, it was to see if the facilitator agreed with their interpretation of an item. In one instance after reading the item *I have send chat invitations to people with similar interests as me,* the participants asked, "so a chat invitation is a phone type thing, is that right?" In these cases, the facilitator often remained silent and waited for the participant to come to their own conclusion. This finding suggests that even when granted the role of authority participants may still feel restricted or the need to consult with the facilitator. It may be that they just want to consult with a third-party and the only one available was the facilitator.

The facilitator can help information science professional participants keep track of their thoughts. On numerous occasions, participants would define a sub-construct label in one way, but place cards in a way that was not consistent with their definition. When the facilitator highlighted this, participants took a moment to reflect and then either modified their definition or moved cards to another label. Take for instance, one participant defined *Embodied cognition* as "a capability that a technology can do but, it is doing the action for me" a few moments later the participant moved all related items to the capabilities

construct. The facilitator reminded the participant that the definition they put forward had capability in the definition. The participant responded with, “okay. Okay so then probably all those that talk about fixing spelling, reminding me of things, how to get somewhere, setup appointments, those sorts of things belong in embodied cognition“ and went on to find the items and moved them. This suggests that the help of a third party is useful , however, it is unclear when this help becomes unproductive. To keep a balance, the facilitator also asked questions when participants placed items in their intended construct.

Cognitive construct sorts

Information science professional participants sorting cognitive construct items found it difficult to determine what did not involve critical thinking. Many participant found that virtually all items in the cognitive primary construct could go in the critical thinking and decision making construct. The comment, “… I guess they all can be critical thinking. All of these are critical thinking skills!” made by one participant illustrates this. The thought that most activities employ critical thinking led several participants to start by articulating why an item did not belong in critical thinking. Take for instance, after reading the item *I can recognize tools that will not help me get the information I need*, the participant when on to say, “the ‘*not’* makes me want to put it in critical thinking because that would be more…but it’s like an information seeking skill.” The difficulties participants experienced placing items into the cognitive sub-constructs is indicative of the fact that most cognitive activities at one time or another requires thought and decision-making.

Adding the phrase “digital tools and spaces” at the end of *Critical thinking and decision-making* removed some of the challenge participants had distinguishing items. For instance, after reading the item *I follow a process when I am trying to figure out if I should buy a particular technology*, the participant said, “that had to do more with digital tools and spaces, rather than how like one uses information, so I am going to put this into critical thinking for now.” Adding the phrase to the end of the construct label provided many information science professional participants with enough of a signal to prompt correct placement. In addition to modifying the critical thinking and decision, making construct label, the information seeking and use labels was modified to include the word “evaluation.” These amendments increased successful placement. Although it does not free us from the recognition, that, most actions can be understood as decision-making.

Technological construct sorts

Information science professional participants had little difficulty clustering like item, but struggled to see the relationship between the embodied cognition items and its label. In one instance, a participant put the embodied cognition items in the capabilities sub-construct because they thought items showed tasks digital technology have the capability to do on behalf of others. They moved the items into the embodied cognition sub-construct after realizing their definition for the embodied cognition construct focused on technology’s capability and the definition for the capability sub-construct focused on a person’s capability. In another instance, a participant put several items in embedded cognition. While putting each one, they person lamented at not being able to have a clear definition of *Embodied cognition.* Take for example,

> "I use technologies to help me do things. Maybe embodied cognition? That is the term that I having the most trouble with. A reminder is something you do in your head, so that you do in your head, and so if you're using a digital technology, I don't know."

Then this participant abruptly moved all of the items into the capabilities sub-construct stating,

> "I use digital technology to remind me of birthdays. I don't really know, I do not think I know what *Embedded cognition* is. So I am going to put these into capabilities because these are all things people do."

Some participants found the term *Embodied cognition* intelligible and ask a result placed items that would be in that sub-construct into other sub-constructs. Further emphasizing this point, another participant said, "See it's the embodied part that is getting me. Cognition is thinking about something."

Social behavioral construct sorts

Information science professional participants found sorting the social behavioral sub-construct items difficult because the labels were not the same level. For example, one participant said,

> "I felt like everything in assertion could go into peers. I started out thinking these were going to be two things. But it almost seemed like well, they could be one thing. The one category seems to include the assertive category."

As another example, another participant said,

> "Peer relationship behavior, I think its, of all the categories, maybe one of the most neutral or general. It is how people interact with each other … It could be a good think like sending an emoji or a potentially bad thing like not standing up for yourself."

In these and other cases, participants expressed having a difficult time determining what would not be a peer relationship behavior. This difficulty often resulted in participants placing items in the peer relationship construct when they were deciding between *Peer relationship* and another sub-construct.

Information science professional participants struggled to find the relationship between the academic behavior construct and the social behavioral primary construct. They believed that the label was referring to formal academic environments. This was in fact the case in how Calderalla and Merrell presented the construct. The label can be extended to account for everyday academic-like behaviors that take place outside of formal settings. Participants may have arrived at their perceptions because the other sub-constructs had many more items and thus gave them more clues and tools to help guide their thinking. Another reason could be that the construct label was inappropriate.

Everyday digital literacy self-assessment analysis

Thirty-six formerly incarcerated individuals completed the self-assessment questionnaire. Below is an analysis of the finding presented earlier in this section.

Technological construct

For all of the items measuring technological awareness, the responses show that nearly all participants are aware of the activities that can be done with digital tools and in digital spaces. Being aware is a

precursory level necessary to advance to more advanced levels. Being aware allows individuals to recognize and interpret things when they engage with them.

For most items measuring technological knowledge, the portion of responses that were between often and without a doubt were about the same as proportion that selected responses between neither never or all the time and never. This suggests that close to half of all participants have gaps in their knowledge. The item where the number of participants who selected never was greater than the number that selected *without a doubt* is *I know how to troubleshoot technology issues*. This implies that even participants that most participants lack knowledge about resolving technology. Consequently, participants would be most likely to find themselves unable complete tasks if confronted by a software or hardware behavior that prohibits them from moving forward.

For many items measuring technological capability, the portion of responses between *often* and *without a doubt* responses was greater than those that selected responses between *neither never nor all the time* and *never.* This suggests that most participants are able to conduct a range of activities. There were six items where the number of participants that selected *never* was greater than the number that selected *without a doubt*. Five of the items deal with troubleshooting. This reinforces responses to knowledge items on the same topic. Being unable to identify and resolve problems is important for people making.

For all of the embodied cognition items, the number of participants that selected between *often* and *without a doubt* were greater than the number that selected responses between *neither never nor all the time* and *never*. However, items dealing with using technology to remember things received fewer responses between *often* and *without a doubt* than other items. These findings suggest that some participants are not leveraging one of the greatest strengths of digital technologies—remembering. In this study, we did not ask participants to provide a narrative to support their response choices, but it leaves one to wonder if those that are not using digital technologies to remember are concerned about the extended memory of the technologies.

Cognitive

For most of the *Critical thinking and decision making about digital tools and digital spaces* items the number participants the selected responses between *often* and *without a doubt* two or more times the amount that selected responses between *neither never nor all the time* and *never.* This suggests that formerly incarcerated participants regularly engage in a range of critical thinking and decision making activities. One is left to wonder how well they are able to perform the activities. The one item where the number of people that selected between *neither never nor all the time* and *never* was greater than the alternative is *I think about ways to use digital technologies that their creators may not have intended*. This raises a series of questions including, are participants aware of the intention of the creators? how do participants refrain from using technologies outside of the creators intentions? and how do respondents respond when creators restrict or extend the range of uses? This finding also leaves one to wonder if participants selected responses between *neither never nor all the time* and *never* because they thought it would be more socially acceptable.

For several of the *Information seeking, evaluation, and use* items, the number of participants that selected responses between *often* and *without a doubt* was more than those that did not. These items typically dealt with information seeking. This indicates that many formerly incarcerated participants can

perform information seeking activities. However, it does not tell us how often they succeed. An analysis of the data shows that the number of participants that selected response between *neither never nor all the time* and *never* for items dealing with evaluation was more than those that did not. This indicates that many participants struggle with information evaluation, particularly distinguishing real from fake. This can negatively impact formerly incarcerated individuals who are trying to do things like reconnect with family and friends, apply for jobs, and open an online account of some type.

The number of participants that selected responses between *often* and *without a doubt* for the item, *I can determine how to use information on the Internet in a way that obeys the law*, was slightly higher than those that did not. However, the inverse is true for a similar item, *I can determine how to present information on the Internet so people know what I copied*. One would have expected that since these two items are asking about the same thing—using information legally—that the results would be similar. This finding suggests that perhaps formerly incarcerated people may not be familiar about uses of information that are considered illegal. It can also be the case that participants selected responses that suggest they know how to use information in legal ways because they believe this is what is expected of them, and indicating otherwise could cause them hardship.

Social behavioral

For most of the *Peer relationship* behavior items, the number of participants that selected responses between *neither never nor all the time* and *never* is one or more times greater than those that did not. This suggests that formerly incarcerated individuals everyday use of digital tools do not consist of behaviors that have become commonplace. There are two items where the number of participants who select between *often* and *without a doubt* was greater than those who did not. Those items are *I communicate with people I know using digital tools* and *I have conversations with peers using text messages.* The responses to these two questions suggest that virtually all formerly incarcerated participants incorporate texting into their everyday digital literacy activities.

For several of the *Self-management* behavior items, the number of participants that selected responses between *neither never nor all the time* and *never* were close to the number that did not. The one exception was, *if someone teases me on the Internet, I let the website owner know*, where most formerly incarcerated participants indicated that they did not. This leaves one to wonder if they are not reporting it because they think it is an unacceptable way to react or if they think letting the owner know does not lead to any meaningful results.

For all of the *Assertion* behaviors items, the number of participants that selected responses between *neither never nor all the time* and *never* was as at least two times the number who did not. The results in this section are similar to results for the *Self-management* behavior dealing with sharing information about a situation. This suggests that participants may need support training and support determining how to respond to social situations that transpire in digital spaces.

Affective

Participants responded to nine affective items. Formerly incarcerated participants' responses were more dispersed to affective construct items than to any other construct items. This suggests that participant's emotional response to everyday digital literacy activities varies. Not the subject of this study, one is left to wonder why emotions of so dispersed. This may be the case because formerly incarcerated people

typically face many barriers once they have reentered the community. A 2020 multi-state study that reports that close to 50% of formerly incarcerated individuals experienced a traumatic event soon after returning to the community (Pettus-Davis, Renn, & Kennedy, 2020) supports this thought.

It may also be the case that their feelings are influenced by their perceptions about specific activities. For example, on the item *How do you feel about obeying the rules of a website* (see Figure 5.22), was the only affective item where 40% or more of participants selected a completely positive feeling. Formerly incarcerated people may have answered this way because while incarcerated or participating in intervention programs, they are reminded about the negative consequences of not following rules. Interestingly, on a similar item, *how do you feel about understanding the rules of a website* (see Figure 5.21), the responses were distributed differently, about half selected negative feelings while another half selected positive feelings. Analyzing the responses the two questions above suggests that although formerly incarcerated participants have positive feelings about obeying rules, they do not have positive feelings about being able to understand the rules they are following.

5.5 Summary

This chapter is organized around the data collected to answer the two research questions of the study. Those questions are:

- What is the composition of a holistic framework of everyday digital literacy?
- What are the digital literacy levels of formerly incarcerated individuals based on measures derived from the proposed framework?

Results from several card sorting sessions strengthened construct and content validity of the Everyday Digital Literacy (EDL) construct and sub-construct items developed following a review of existing literature. With feedback from over 40 information science-related professionals, I reduced 169 construct items to 119 items. Card sorting sessions demonstrated that among the four primary constructs—technological, *Cognitive*, *Social behavioral*, and affective--*Social behavioral* construct items presented challenges to participants who found themselves placing items in the *Affective* construct. Similarly, during the card sorting sessions where participants sorted items under sub-constructs, the *Social behavioral* sub-construct items presented the greatest challenge for participants. In several cases, participants comments and decisions illustrated that had difficulties on settling on a *Social behavioral* sub-construct label to place items under because they believed it could go under more than one.

Focus group sessions with formerly incarcerated individuals and one-on-one discussions with researchers led to refinements to the EDL questionnaire. One category of changes made the instructions and format of the self-administered questionnaire easier for research participants. The other changes resulted in the addition of questions, allowing information to be collected that adds additional depth to information collected in the first part of the questionnaire.

Fielding the questionnaire pilot with 36 formerly incarcerated individuals provide insights into their levels of EDL. Results show that most formerly incarcerated participants have a high level of technological awareness, but many struggle in all other aspects of EDL. Participants responses indicate that they struggle the most with most aspects of social behavior connected to EDL. Their practice of *Social behavioral* are lower than activities in other constructs. Results also show that participants struggle with evaluating information, specifically distinguishing real from fake. Responses to the affective questions show that participants' affective state varies depending on the sort of activity

performed. Participants selected emotions closer to the negative end of the affective scale for activities including, sharing information, understanding rules, and navigating digital device.

6 Conclusions, limitations, implications, and future work

6.1 Summary and discussion of findings

Everyday digital literacy

Researchers and practitioners recognize that being digitally literate is important across all domains of a persons' life. Although diverse definitions of digital literacy exist in the literature, few are the result of conceptually grounded empirical studies. Moreover, their focus on cognitive and technological constructs fails to provide a complete description of the phenomenon. It is for these reasons that this dissertation sought to develop and validate a holistic framework of everyday digital evidenced to answer the first research question:

> "What is the composition of a holistic framework of everyday digital literacy?"

An intensive literature review disclosed several themes surrounding digital literacy. Discussions around the increasing use of digital technologies for professional, personal, and leisure activities points up the relevant affordances (digital technologies) potentially available in social material situations (digital spaces) relative to individuals' abilities (action readiness) to engage social cultural practices (everyday digital literacy) embedded in those digital spaces. Discussions also highlight that social interactions using digital technologies have become commonplace and expected by some users.

Another body of literature explores definitions and manifestations of and the benefits of high levels of digital literacy. This literature reveals that there are multiple definitions of digital literacy and highlights that although some aspects of digital literacy are fix, many more dimensions are in constant flux, influenced by the technologies of the era. The literature emphasizes that digital literacy helps individuals navigate and expands the ways that they participate in the world around them. Thus there have been calls to help equip people with the ability to use digital tools to engage with one or more people synchronous and asynchronous environments.

The literature on digital literacy also includes research on measuring peoples digital literacy. This literature demonstrates that most digital literacy measurement tools fall short because of a hyper focus on technological and cognitive aspects of digital literacy to the peril of social and affective aspects. To address this shortcoming and understand more about social behaviors, the literature review was expanded include the works from sociology and psychology, which serves as the basis for the *Social behavioral* construct of the *Everyday digital literacy framework (EDLF)*. The affective aspect recognizes that the people's emotions transcend across all constructs that collectively represent an individual's digital literacy level. There is a large body of information science related literature explore affect. The Kuhlthau's information seeking process model which allows for thoughts, feelings, and emotion informs the affective construct and measures used in the dissertation research.

The everydayness of digital tools and digital spaces in our daily lives also necessitates drawing attention to idea that technology is an extension of ourselves. The intense literacy review also uncovered a body literature on *embodied cognition* that portrays digital tools as an extension of ourselves. Embodied cognition posits that in some situations, cognitive processes extend beyond their traditionally considered boundaries within one's head. For example, an individual's using a digital personal assistant (for example Microsoft Cortana, Google Assistant, Apple Siri) to look up the spelling of an obscure word or a fact will know the answer more quickly than an individual using a dictionary or an encyclopedia. At

first, the Embodied cognition in the cognitive construct along with two other constructs. Card sorting results showed that participants were consistently placing the items developed for this construct into the primary construct labeled technological and migrated the sub-construct there.

Another major finding was that the social behavioral, embodied cognition, and everydayness aspects of digital literacy were not represented in the existing frameworks. Even the most holistic of the digital literacy frameworks ((Eshet-Alkalai, 2012) (Calvani, Cartelli, Fini, & Ranieri, 2008) (Cartelli, 2012) (Ng, 2012) stopped at the digital tools and digital spaces levels. Defining and explaining the technologies themselves (e.g., tools and systems), is the easy way out and misses key aspects that this dissertation identified and developed, namely the social behavioral, cognitive, affective, and everydayness aspects. These are more difficult to articulate, but this dissertation found that they appear to be more vital and of lasting importance. Clearly, need to take them further and to build on and expand existing holistic frameworks, and that was the second research goal of this dissertation.

Therefore, a closed card sorting activity was used to continue to address the first research question, "What is the composition of a holistic framework of everyday digital literacy?" and led to several significant discoveries. One discovery was that the participants confounded the social behavioral and affective constructs items. This was especially the case for social behavioral sub-construct items depicting interactions where feelings were being shared with one or more people. This discovery became clearer when tweaks to the language of the specific items did not correct the behavior. Additional research is necessary to understand if the items in question need to be constructed in a different way, the social behavioral and affective constructs need to be represented in a different way, or some other intervention is necessary.

Another discovery made is that although the social behavioral construct concerned with offline environment has similarities to those of digital environments there are differences that call for additional investigation. This research used the construct label proposed by Caldarella and Merrell in the seminal work on positive social behaviors. On numerous instances participants struggled to reconcile how social behavioral construct labels related to the everyday digital literacy items. For example, while sorting items into the *Peer relationship* behaviors sub-construct participants mentioned that *Peer relationship* behaviors sub-construct label was abstract because most activities involve *peers*. While others thought the items they placed into the *Peer relationship* behaviors sub-construct could be divided into additional sub-constructs.

The *Academic behaviors* sub-construct also ran into difficulties early on. Most participants mentioned that the *Academic* sub-construct label provoked thoughts of higher educational spaces (for example, colleges & universities). Once they began sorting, most noticed that there were no items in the *Academic* construct and expressed fear that they may have overlooked items.

Formerly incarcerated individuals Everyday digital literacy levels

In the United States, incarceration and the reentry of incarcerated persons into their communities is a problem. There are over two million people in prison. The hundreds of thousands of men and women who reenter their community every year face many barriers and challenges. These challenges touch all aspects of their lives and include things such as reconnecting with family, locating employment, taking advantage of educational resources, and living crime free lives. In contemporary society, all of these

aspects of people's lives are affected by digital technologies. Individuals leaving prison need to know how to integrate digital technologies in to their everyday lives.

However, incarcerated individuals rarely have access to the open Internet. Access to computers is typically limited to individuals enrolled in a prison education course and individuals interested in doing legal research. Companies have contracted with prisons to provide incarcerated individuals with access to digital technologies but such access is selective and varies greatly. For example, JPay, a company that provides an elementary form of email service that remains disconnected from the larger web, has been known to charge incarcerated people as much as 47 cents to send an text message. JPay is used by 21 state correctional agencies, along with numerous jails and private prisons. Many of this criminal justice institutions even receive commission (Cobb, 2020). Very few of the reentry orientated educational programs provide anything that resemble digital literacy training. Furthermore, there is no substantive research on the nature of these programs or their efficacy. Thus, we have no reliable or valid data about the extent to which formerly incarcerated individuals become digitally literate even as a result of participating in these rarely offered programs. It is for these reasons that this dissertation sought to collect data about the everyday digital literacy levels of formerly incarcerated people, which provided evidence to answer the second research question:

> What are the digital literacy levels of formerly incarcerated individuals based on measures derived from the proposed framework?

This second question is answered through the use of three focus groups and two one-on-one consultation sessions; and administering the Everyday Digital Literacy questionnaire to 36 formerly incarcerated individuals.

The focus group sessions led to both methodological and empirical findings. The methodological finding is that working with formerly incarcerated individuals yield similar and distinctly valuable findings. For example, both the formerly incarcerated participants and research experts identified structural problems with the questionnaire (e.g. formatting of scale in affective section of the questionnaire). However, they each also identified issues that their experiences allow them to do. For example, the researchers identified the need for additional questions that would increase the ways the data could be analyzed. As another example, the formerly incarcerated participants raised the point that in order to be more inclusive, the question, "what is your status today?" should include additional options. They then went on to list the options. This important because there is a direct relationship between their status and the sorts of digital tools and digital spaces they are granted access to.

In the next part of this research, 36 formerly incarcerated people completed the everyday digital literacy questionnaire as part of a pilot. An analysis of this data resulted in several observations. Participants responses indicate most have a between a low and medium EDL.

6.2 Limitations

The research presented here represents the tip of the iceberg in respect to frameworks of *EDL* and the *EDL* levels of formerly *incar*cerated individuals. The EDLF developed in the course of this research represents the first step in capturing the complexities of a holistic framework everyday digital literacy conceptually. Though it fulfilled its purpose in this research some of its shortcomings have become evident. On the broadest level, the EDL deals exclusively with Internet based activities. The decision to focus on Internet based activities was intentional, motivated by the fact that many digital tools and

spaces have built in mechanisms to make artifacts available to individuals with limited connectivity. Nonetheless, this does not free the framework items from the fact that they do not account for the everyday digital literacy activities that take place in non-Internet spaces by choice or by circumstance.

The EDLF presents a technological construct whose sub-constructs capture with four sub-constructs. The awareness sub-construct items presents items that measure participants awareness about current day Internet related digital technologies and spaces. What it does not do is present items that consider non-Internet related technological related artifacts that it is important for someone with high levels everyday digital literacy level to be awareness of. Nor does it present more cutting edge or nascent digital technologies that individuals may in the future encounter or use in the future. The technological construct went as far as presenting a sub-construct labeled embodied cognition meant to highlight and distinguish uses of digital technologies and digital spaces that replace, support or direct cognitive processes. The label *embodied cognition* appears to have alienated participants. Most participant were unable to accurately define the sub-construct on their own, nor was it always clear to them the relationship between the sub-construct item and the label.

The EDLF tried to capture and present a conceptual representation of social interactions as described in the literature. To facilitate this process a model depicting pro-social behaviors in an educational setting was adapted. This resulted in a mature articulation of the social behavioral construct. However, it falls short in a few ways. First, it adapted the items to account for difference between face-to-face and digital settings. As a result, the items developed were guided by the original set of items and did not venture far beyond that. As a result, the framework's items may miss everyday social activities individuals engage in digital spaces. Since the original authors of the framework were not thinking of everyday digital literacy when developing the labels, they. It was discovered during the card sorts that this was the case for some participants.

The EDLF is constructed using the feedback of some 40 information science-related professionals. Their professional provides them the tools necessary to complete the card sort and provide rich feedback with little oversight. However, it also means non-information science professionals might have sorted it differently. The nature and process of card sorts, a participative research method, along with the time constraints of this research prevented me from convening a larger number of participants across a range of demographics.

The self-assessment questionnaire was piloted with 36 formerly incarcerated individuals. The participants represent a small set of formerly incarcerated people that return to the community year. Although it would have been ideal to have at least 100 total respondent resource limitations made that impossible. As a result, any patterns or trends identified during the analysis cannot speak for anyone outside of the study. Furthermore, the research is unable to make any conclusive statements about the efficacy of the questionnaire items in measuring formerly incarcerated individuals EDL.

The self-assessment questionnaire uses two types of scales. The sentence completion scale, part of the Likert scale family, was used in all but the affective section. The research uses a 11-point scale and posits it as an interval scale. Presenting it as an interval scale allows researchers to claim that there is order, the difference between the two variables is meaningful and equal. It also allows particular quantitative tests to be ran. However, the sample size in this research was too small detracting from the value of running such tests.

The self-assessment questionnaire is designed to let participants to read an item, evaluate the item as it relates to their situation, and select the most appropriate response. They provide participants with more agency and authority. However, responses on self-assessment questionnaires are not always reflecting of the participants reality. In this research the self-assessment questionnaire was not followed up with a scenario-based assessment or semi-structured interview which could help demonstrate the value of the self-assessment questionnaire.

6.3 Recommendations for actions and policy

The methods used in this research helped in the creation of an Everyday Digital Literacy framework and a corresponding questionnaire. The methods helped provide a snapshot of the everyday digital literacy levels of 36 formerly incarcerated individuals. Conversations with research participants along with an analysis of the data collected make it possible to surface recommendations that support the strengthening of individuals' everyday digital literacy levels.

Several research participants mourned at the fact that the department of corrections provided litter to no everyday digital literacy training while incarcerated nor immediately prior to their return to the community. These and other revelations suggest that department of corrections' personnel implement an everyday digital literacy curriculum that extends beyond the formal classroom. It is recommended that corrections educators use the situated learning approach in the classroom. This approach posits that providing everyday digital literacy education in the incarcerated settings will create a meaningful experience for participants. The training should not focus primarily on digital technologies or software applications. Nor should the training focus on mechanical uses of the artifacts. The training should be dynamic and responsive and include segments on topics including positive social behaviors in digital environments, responding to negative social behaviors, discerning legitimate artifacts from malicious ones, and troubleshooting.

A variety of risk and need assessment tools have been developed and are implemented by correctional institutions. Risk and needs assessment tools measures offenders' criminogenic risk factors and specific needs that if addressed will reduce the likelihood of future criminal activity. Institutions use the assessment tool to collect data on behaviors and attitudes and make determinations about which incarcerated individuals need higher levels of supervision and/or match them to the appropriate rehabilitative programming. Digital literacy, declared a Human Right by the United Nations, is not considered in current tools. Corrections administrators should include amend the current assessment tools to collect data on incarcerated individuals everyday digital literacy related awareness, knowledge, skills, and abilities. Doing so will enable correctional institutions to identify and address low digital literacy levels.

Though one could argue that denying newly incarcerated individuals with access to Internet enabled digital tools can mitigate safety concerns, the same claim for individuals nearing the their date of reentry is questionable. Research suggests that providing individuals with access and training can strengthen their EDL levels, thus increasing their chances of success in the community. Policy makers should consider requiring correctional institutions to implement a staircase approach where individuals are gradually given increasing access to Internet enabled technologies. They should also provide guidelines that make clear the genres of digital technologies and digital spaces and the timeframes (for example access to Mavis Beacon 12 weeks before release; indeed.com 6 weeks before release).

Most correctional institutions already have a range of digital technologies in their facilities. The two most common are kiosks from which they have the ability to send email-like messages and spaces that allow incarcerated people to participate in video calls. These and other technologies in facilities can be used as a springboard to help incarcerated people strengthen their everyday digitally literacy levels. Currently individuals have to pay to use many of these technologies. This is problematic because formerly incarcerated people often do not have the resources to pay the expenses. Policy makers should propose policies that remove the barriers to use by incarcerated people. Models policy makers put forward should consider call for the removal of fees entirely, subsidize the cost to incarcerated individuals or provide incarcerated people with a minimal number of free uses of the technologies each month.

The digital technologies available in corrections facilities often come from the department of corrections or are provide as per a public-private partnership. Some of the technologies made available to incarcerated people are a result of the public-private partnerships. There is a lot of ambiguity around the terms of the public-private partnerships (Harris et al., 2019). We do know that incarcerated people who make very little (Cobb, 2020)., are often charged to use the technologies, the pricing structure is not always transparent, and correctional institutions often receive some percentage of all transactions made using the digital technologies. Policy makes should seek greater clarity around the terms of the contracts, specifically charges to incarcerated people, how much correctional institutions receive, and how correctional systems allocate the money. In addition should consider requiring corrections institutions earmark some portion of what they receive from incarcerated individuals transactions to support everyday digital literacy programming and to investigate possible implementations of Internet access in incarcerated environment.

There are an increasing number of private companies developing and marketing different technologies to criminal justice agencies. In many cases, these companies negotiate contracts making them the sole provider of digital technology services to correctional institutions (Harris et al. 2019). It is not clear if corrections agencies are asking the right questions before be sign a contract nor if they are considering how the decisions they make adversely impact incarcerated individuals and people who are under supervision while in the community. These negative experiences can result in lower everyday digital literacy levels and present obstacles when helping individuals increase their everyday digital literacy levels. To address this and unmentioned issues with the privatization of criminal justice digital technology services policy makers should require correctional agencies to work with a non-criminal justice related committee made up justice involved community members, formerly incarcerated individuals, technologists and policies researchers. This committee would be tasked with evaluating technologies targeted at incarcerated people before technology are presented to the department of corrections for consideration. Having a third-party complete the evaluation would increase the likely that the technologies being introduced do not adversely impact an already vulnerable population.

When attempting to convince corrections institutions to enter a contractual relationship, private companies often present a proposition that corrections institutions cannot refuse. This may include discounts on installation and monthly fees. Some companies volunteer to manage the services and take on the responsibility of maintaining and securing artifacts related to the digital technologies. In exchange correctional institutions get a portion of all transactions conducted by system users. Policy makers should require all vendors to include information about how their products promote strengthening everyday digital literacy levels.

Transitioning from incarceration back into the community is not easy. Individuals need often find themselves alone and required to do activities including finding a job, locating an approved place to live, reconnecting with family and friends, and obtaining proper identification. They now have the additional responsibility of attaining a level of digital literacy high enough to help them efficiently complete day-to-day activities. Policy makers should explore extending the scope of work transitional housing programs do to include everyday digital literacy support. Along with the new scope, policy makers should explore extending the number of days individuals can remain at a transitional housing unit to account for the time it takes to attain sufficient everyday digital literacy levels.

6.4 Future research

The importance of everyday digital literacy is marked by the increasing integration of digital tools and digital spaces in our daily lives. The research presented here develops a holistic framework that captures the elements of everyday digital literacy and then refines and pilots a self-assessment questionnaire based on the framework with formerly incarcerated individuals. The intensive literature review and analysis of the data collected signals a need for additional research.

During cards sorts many participants had an easier time placing items into primary constructs than they did into sub-constructs. Some participants found some sub-construct labels constraining. This was most pronounced when participants had to sort social behavioral construct items. The difficulties they experienced maybe attributed to the use of closed card sorts. Future research should explore conducting additional card sorts using the open card sort method. The open card sort provides participants with the ability to determine their own construct labels and pile size. The results of the open sorts can used refine construct labels and items.

In this research formerly incarcerated participants completed a self-assessment questionnaire. Findings suggest a high level of awareness, medium level of knowledge, low levels of capability across different measures, and mixed feelings about their capabilities. The next step is to see how well formerly incarcerated individuals can complete everyday digital literacy tasks. To understand this researchers' should consider putting together a qualitative study where they observe participants using digital tools and digital spaces in a natural or controlled environment. If researches opt for the controlled setting, they should construct a scenario-based assessment that establishes everyday tasks and then measures formerly incarcerated individuals' ability to complete them. In both versions, researchers should define what their focus will be, attention to speed in some scenarios, challenges faced in others, and success rate in others.

The criminal justice literature consistently demonstrates that the sooner formerly incarcerated people can become employed, the less likely they are to be reincarcerated. The digital literacy literature suggests that the higher ones level of digital literacy, the more likely they are to succeed in today's society. This research found that no participants had high digital literacy levels and that man rated themselves low in measures of information seeking, evaluation, and use. The question of how low everyday digital literacy levels impacts formerly incarcerated individuals ability to become gainfully employed needs to be explored.

The digital inclusion literature informs us that one effective way to help increase individuals digital literacy levels is to provide access to the physical artifacts and the supporting elements such as Internet connectivity. Some states, including Washington State, have laws that prevent some formerly

incarcerated people from using digital technologies for some period after they return to the community. This restriction extends beyond just individuals committed offenses using digital technologies. Several research participants identified themselves as individuals who would be reincarcerated if they used digital technologies. This sort of restriction is counterproductive to the goals of successful reentry. Future work can help us understand how widespread these sorts of restrictions are, how they came about, and the impact of the restrictions on formerly incarcerated people.

Transitional housing programs typically offer formerly incarcerated people housing for a limited period of time, often not extending beyond 90-days. The programs, often funded by department of corrections is supposed to ensure formerly incarcerated people successful transition to the community upon release from prison or jail. They are supposed to do this by mitigate problems formerly incarcerated people may encounter on the outside after serving their sentences to allow the offender to concentrate on adjusting to life on the outside. A cursory search suggests that future researchers should work with transitional housing programs to understand what they could do to support formerly incarcerated people in strengthening their everyday digital literacy levels.

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8 Appendix

Appendix A: Card sort recruitment letter

Hi [NAME],

I am a PhD Candidate at the University of Washington's Information School. I am working on a research project to learn more about what people understand about digital technology and what people can do with digital technology—digital literacy.

After an extensive literature review, I noticed there was a gap in current frameworks of digital literacy. To address this gap, I developed the Everyday Digital Literacy framework. The framework still needs to be validated and I need your help. I will be using a card sorting method to help establish validity. And would like you to be one of the participants.

What is involved?

You do not have to do anything to prepare.

On the day we meet, In short, I will give you an unsorted deck of cards that have statements on them. I will also give you deck of cards that have category labels. I will then ask you read the cards and put them into the different categories based on how similar the statements are. At the end I will ask you a few questions.

The whole process should take less than 90 minutes.

How to sign up

Respond to this email by [DATE] and let me know if you want to participate or not. If you want to participate, please include three dates and times that you would be able to meet and go through the activity.

Thank you for your time!

Lassana Magassa

Appendix B: Card sort instructions

- Please organize the following items into categories
- Give each category a definition

Example of sorted items

CATEGORY: Fruit flavors

Strawberry

Raspberry

Blueberry

CATEGORY: Chocolate-based

Chocolate

Double chocolate chip (DUP)

Chocolate fudge brownie

Chocolate fudge swirl

Chocolate chip

Double chocolate chip (DUP)

Mint chocolate chip

Chocolate chunk

CATEGORY: Consistency

Smoothie

Milkshake

Appendix C: Focus group recruitment flyer/posting

Volunteers Needed!

Looking for people to participate in a Focus Group

Give us feedback on a questionnaire about digital literacy

FOR MORE INFORMATION CONTACT
Lassana Magassa
206.552.0034 lmagassa@uw.edu

$25.00 gift card for participation

Focus Group Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Focus Group** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Focus Group** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Focus Group** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Focus Group** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Focus Group** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Focus Group** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu

Appendix D: Focus group recruitment email

Hi [Name].

I am a PhD Candidate at the University of Washington's Information School. I am working on a research project to learn more about what people understand about digital technology and what people can do with digital technology. This is called digital literacy. I created a questionnaire to teach me about peoples' digital literacy levels. In my project I ask formerly incarcerated people to complete a questionnaire.

I am setting up several focus group sessions to make sure the questionnaire is easy to read and understand. The people who are invited to the focus group interview sessions are people who have ever been incarcerated, people who work with incarcerated people, and people who know someone close to them that is or was incarcerated.

We would like to invite you to take part in a group interview that will take approximately two hours. The goal is to help us design the best questionnaire possible.

You do not have to do anything ahead of time to prepare.

What is involved?

In the first part of the session, you will complete the questionnaire by yourself looking out for things that would make the questionnaire difficult for individuals to read and understand.

In the second part you will be interviewed. During the interview we will go through the questionnaire together so you can tell us how to make the questionnaire easier to read and complete

Time commitment: About two hours

What's in this for you <incentive>

How to sign up

If you are interested in volunteering, contact me, Lassana Magassa at lmagassa@uw.edu or (206) 552-0034

If you have any questions, feel free to contact me at the address above.

One more thing: *if you know any one that may also be interested in participating, feel free to send them my information and ask them to contact me.*

The information that you provide will help us make the questionnaire easier for people to complete. I look forward to hearing from you soon and arranging a time to meet.

Thanks very much!

Regards,

Appendix E: Focus group interview guide

Interviewer introduction

Hi I am [NAME]. I am the [POSITION/TITLE] at [INSTITUTION]. This is [NAME of co-facilitation] who will be assisting me with recording and taking notes.

I would like to thank everyone for volunteering to participate in this focus group study. This focus group is part of a larger research project that is interested in learning about how much people who have just been released from prison understand about and can do with digital technologies like the Internet, cellphones and computers. Feel free to ask questions about the research project itself at any time. Does anyone have any questions about the session at this time?

Before we get into the actual discussion, I would just like to say that the purpose of this focus group is to make the questionnaire easy to understand and fill out. So I want you to tell me when you don't understand something or where you think I can make something more clear. I would like your help understanding how you interpreted the instructions, questions and response categories. There are no wrong answers. We are interested in making the questionnaire easy for people to complete.

We are going to start by getting your general impressions about the questionnaire. This is so you can talk about what you did not understand, what was confusing, or places where you did not know what to do. It can be about the font size, specific questions, instructions, answer choices, or anything else.

Then we will go through each section and pick a few questions and discuss your interpretation of these items. Then, at the end, if you have a particular item that we didn't discuss, please bring it up.

Do you have questions about anything that has been said? [Answer questions]

Great, now before you begin, here I have a few tips that will help once we start talking about your experience filling the questionnaire out:

- Circle words you do not understand
- Cross out words you think are not necessary
- Underline sentences and words that are unclear
- Edit questions that are confusing so they are clearer

Beginning discussion

I want to reiterate the fact that it is important that you understand that there are no right answers. I am trying to learn whether I am getting things right, not whether you are!

I do not expect you to be able to explain or define everything. I think there may be some words you can define or explain. It is important that I know what you do not understand, so I can figure out how to make it understandable.

I would like everyone to feel comfortable offering his or her viewpoint. It would be preferable if only one person speaks at a time, since it is difficult when listening to the tape to hear all the comments when two people are talking at the same time.

General question

1. What is your impression of the questionnaire?
2. How easy or hard was it to complete the questionnaire?
3. Which part is easiest?
4. Which part was the most confusing?
5. Which words were difficult to understand?

Targeted questions

What is a digital technology?

How would you define digital technology?

Let us look at xx. What does "search words" mean here?

Let us look at xx. "…my search words are not getting me what I need" How did you respond to this item? What does your response mean – can you provide an example of search words not getting you what you want?

Let us look at xx. What does it mean to "change my search words"?

Lets look at items 12-14. How did you find these questions?

Does anyone have any remarks to share about items 20 – 29?

Let us look at xx. What does information?

Closing questions

1. Are there any questions that you found hard to answer?
2. Did you find any response sets hard to use or confusing?
3. Was there anything that you expected to see asked that was not in the questionnaire?
4. What should I add or change on the survey?
5. Is there anything that we failed to ask you about in the questionnaire – anything that you see as very important to digital literacy?
6. Are there any questions you think should be deleted?
7. Do you think most people will find these questions clear and easy to understand?
8. Are there any important questions we didn't ask you?

General Comments for Conducting Meeting:

- Remind participants of the value of differing points of views;
- Does anyone see it differently?
- Are there any other points of view?

Probes:

- Would you explain further? Can you give me an example of what you mean?
- Would you say more? Is there anything else? Please describe what you mean
- Tell me more about that. Does anyone have a different response?
- Can you say this question in your own words?
- How did you choose your answer?

- How easy or hard was it to answer this question?
- How sure are you of your answer?
- Does this question apply to you?

Focus group closing

Thank you for participating in this discussion. Your responses will help us make the questionnaire better.

These are all the questions I have for you. Do you have any other comments about your experiences that you would like to share with me?

Your comments were very helpful. Thank you very much for your time.

Appendix F: Questionnaire recruitment flyer

Help us learn what you know about and can do with digital technology

Have you ever been incarcerated?
Come and complete a questionnaire
about digital literacy
FOR MORE INFORMATION CONTACT
Lassana Magassa
206.552.0034 lmagassa@uw.edu

$25.00 gift card for participation

Digital literacy study Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Digital literacy study** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Digital literacy study** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Digital literacy study** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Digital literacy study** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Digital literacy study** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu	**Digital literacy study** Lassana Magassa 1(206)552-0034 lmagassa@uw.edu

Appendix G: Questionnaire recruitment email

Hi [NAME].

I am a PhD Candidate at the University of Washington's Information School. I am working on a research project to learn more about what people understand about digital technology and what people can do with digital technology. This is called digital literacy. I created a questionnaire to teach me about peoples' digital literacy levels.

There is not much information about formerly incarcerated peoples' digital literacy. I am interested learning more about this.

If you have ever spent time incarcerated, I would like to invite you to participate in my research.

What is involved?

I will give you a questionnaire that contains questions and statements. Each question and statement help me learn about a different part of digital literacy. I want you to read each question or statement and provide a response in the questionnaire.

Time commitment

As much time is it takes you to complete the questionnaire.

What's in this for you?

$25.00 gift card.

How to sign up

If you are interested in volunteering, contact me (Lassana Magassa) at lmagassa@uw.edu or (206) 552-0034.

If you have any questions, feel free to contact me at the address above.

One more thing: *if you know any one that may also be interested in participating, feel free to send them my information and ask them to contact me.*

Thanks very much!

Lassana Magassa

Appendix H: Everyday digital literacy questionnaire booklet

The items below are based on Table 4.1, Table 4.2, and Table 4.3.

	Never										Always without fail
	0	1	2	3	4	5	6	7	8	9	**10**
I use digital devices to help me remember things.											
I use digital devices to do things for me (for example calculate a price, let me know today's temperature).											
I use digital devices to help me get more things done.											
I use digital devices to get me from one place to another.											
I use voice command to use the Internet.											

	Never										Continuously vs. continually
	0	1	2	3	4	5	6	7	8	9	**10**
I think about the benefits of using digital devices.											
I think about the risks of using digital devices.											
I think about how my privacy is impacted by digital devices.											
I think about how the way I use digital devices affects my relationships with people I know.											

	Never										Always, without fail
	0	1	2	3	4	5	6	7	8	9	**10**
I follow a process when I am trying to figure out if I should buy a particular technology.											
I follow a process when I am trying to figure out if I should use a particular Internet site.											
I follow a process when I am trying to figure out if I should use a particular app.											
I decide which digital devices to use based on their security features.											
I decide what digital devices to use based on their benefits.											
I decide what Internet sites to visit based on the negative risks associated with using a website.											
I decide what Internet sites to visit based on the benefits associated with using a website.											
I decide how to use digital devices despite what their creators intended.											
I decide to share my opinions about how I believe a technology should work when it does not work the way I expect.											

	Not at all										I can do that easily / Definitely
	0	1	2	3	4	5	6	7	8	9	**10**
I know if my search words will get me information I need.											
I know what do if my search words are not getting me the information I need.											
I can search the Internet to get the things I need.											
I know the formats (for images, documents, and videos) that files can come in.											
I know how to find information in a format (article, picture, video, etc.) that will help me best.											
I know how to change my search words if I am having problems.											
I know if information I am looking at on the Internet real or fake.											
I can tell if information from the Internet will answer my question.											

	Never										Always without fail
	0	1	2	3	4	5	6	7	8	9	**10**
If I use information I find on the Internet, I include the URL so other people can find it.											
I use the information I find on the Internet in a way that does not break the law.											

The items below are based on Table 4.4, Table 4.5, and Table 4.6

	Never										Definitely
	0	1	2	3	4	5	6	7	8	9	**10**
I have heard about computers and laptops.											
I have heard about smartphones.											
I have heard about the Internet.											
I have heard about social media.											
I am aware that files can be downloaded from the Internet.											
I am aware that digital devices have security settings.											
I am aware that it is possible to buy items from the Internet.											

	Not at all										Definitely
	0	1	2	3	4	5	6	7	8	9	**10**
I know what things computers and laptops are good at doing.											

I know what things smartphones are good at doing.											
I know the difference between operating systems and software applications.											
I know the difference between a cellular network and Wi-Fi network.											
I know how to troubleshoot technology issues.											
I know what a mouse is.											
I know what keyboard shortcuts are.											
I know what a private window in an Internet browser is.											
I know what the back and forward buttons in an Internet browser are used for.											
I know what Internet browser bookmarks used for.											
I know how to find the security settings on a digital device.											
I know what things can be bought on the Internet.											
I know the risks of using technology.											
I know risks of using the technology.											

	Not at all										Definitely
	0	1	2	3	4	5	6	7	8	9	**10**
I can use a computer mouse.											
I can use keyboard shortcuts.											
I can open a private window in an Internet browser (Chrome, Internet Explorer, Safari, etc.).											
I can use the back and forward buttons in an Internet browser.											
I can use bookmarks in my Internet browser.											

	Never										Always without fail
	0	1	2	3	4	5	6	7	8	9	**10**
I can download files from the Internet.											
I can change security settings on a digital device.											
I can purchase products on the Internet.											
I can makes changes in files (document, presentation, spreadsheet, video, etc.).											
I can figure out what to do if a digital device is frozen											
I can troubleshoot problems with digital devices											
I can get the information I need to fix basic technological issues											

The items below are based on Table 4.7, Table 4.8, Table 4.9, Table 4.10, and Table 4.11.

	Never										Always without fail
	0	1	2	3	4	5	6	7	8	9	**10**
I have conversations with people using digital devices.											
I participate in discussions with people on the Internet.											
I share my feelings with people on the Internet.											

I share my feelings with people using emoticons.											
I pay attention to the feelings that come through the things people put on the Internet.											
I change the way I say things on the Internet if I think it will hurt someone's feelings.											
I help people on the Internet if I see they need help.											
I regularly communicate with people I know using digital devices.											
I often share things I find on the Internet with people on the Internet.											
I can find people I know by searching the Internet											
I can search the Internet to find people who have interests similar to mine.											
I can use digital devices to invite people to do things with me.											

	Never										Always without fail
	0	1	2	3	4	5	6	7	8	9	**10**
I know what I can share on the Internet.											
I can act in appropriate ways on the Internet.											
I can use appropriate language on the Internet.											
I know how to respond if someone starts problems with me on the Internet.											

	Not at all										Definitely
	0	1	2	3	4	5	6	7	8	9	**10**
I can study on the Internet by myself.											
I can finish things I am working on in a timely. manner even if I am connected to the Internet.											
I can do more things as once when I am using a digital device to do them											
I ask for help on the Internet when I am having trouble doing something.											
I ignore non-emergency Internet alerts and notifications when I have something to do.											
I can focus better on finishing something when I am on the Internet.											
I follow the rules for the websites I visit.											
I understand the rules for different Internet websites.											
If the owners of a website asks me not to do something I will not do it.											
I follow website rules even if they do not make sense to me.											

	Never										Always, without fail
	0	1	2	3	4	5	6	7	8	9	**10**

I stand up for myself when people disrespect me on the Internet.											
I join groups on the Internet that interest me.											

The items are based on Table 4.12.

How do you feel about using digital devices to remember things?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel searching for information on the Internet?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**

	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about your choosing a trustworthy website for information?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about finding files on a digital device?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about adjusting the security settings on a digital device?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about completing forms on the Internet?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about participating in discussions on the Internet?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about obeying the rules of a website?											
	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

How do you feel about sharing information with people on the Internet?											

	Confused							Clarity			
	5	4	3	2	1	0	1	2	3	4	**5**
	Frustrated							Encouraged			
	0	1	2	3	4	5	6	7	8	9	**10**
	Afraid							Fearless			
	0	1	2	3	4	5	6	7	8	9	**10**
	Anxious							Unworried			
	0	1	2	3	4	5	6	7	8	9	**10**
	Unconfident							Confident			
	0	1	2	3	4	5	6	7	8	9	**10**
	Discontent							Satisfaction			
	0	1	2	3	4	5	6	7	8	9	**10**

Appendix I: Demographic items in questionnaire

About you

What is your sex (mark one box)

- ☐ Female
- ☐ Male

How old are you today?

☐ _____ years old.

Marital status (mark one box)

- ☐ Now married
- ☐ Widowed
- ☐ Divorced
- ☐ Separated
- ☐ Never married

Race

What is your race or origin (mark all the boxes that apply)?

- ☐ **African American/ Black** - origins in any of the Black racial groups of Africa
- ☐ **American Indian or Alaskan Native -** origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment.
- ☐ **Asian** - original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
- ☐ **Hispanic, Latino, or Spanish** – Including for example, Mexican or Mexican-American, Puerto Rican, Cuban, and Columbian.
- ☐ **Native Hawaiian or Other Pacific Islander** - origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- ☐ **White** - origins in any of the original peoples of Europe, the Middle East, or North Africa.
- ☐ **Other** (please specify):

Education (prior to incarceration)

What is the highest level of education you have completed (mark one box)?

- ☐ Pre-primary or no schooling
- ☐ Grades 1-6
- ☐ Grades 7-9
- ☐ High School Diploma or GED
- ☐ Associate degree
- ☐ Bachelor's degree (for example BA, AB, BS)
- ☐ Master's degree (for example MA, MS, MEng, MEd, MSW, MBA)
- ☐ Professional degree (for example MD, DDS, DVM, LLB, JD)
- ☐ Doctorate degree (e.g. PhD, EdD)

What year did you complete the highest level of education?

☐ Year:	_____

Incarceration

Have you ever been incarcerated (mark one box)?

- ☐ Yes
- ☐ No (if "No" go to Question x.)

When were you last incarcerated?

Month:	_____
Year:	_____

When were you released?

Month:	_____
Year:	_____

Where were you sentenced to?

- ☐ Jail
- ☐ Prison
- ☐ Other (please specify):

How long were you incarcerated (for example "5 years and 4 months" or "60 months")?

Experience with digital technologies in a class setting

Where you enrolled in any classes during your last 6 months of your most recent incarceration?

Yes
No (if "No" go to Question x.)

Did you use any of the digital technologies in any of your classes during your last 12 months of incarceration?

Yes
No (if "No" go to Question x.)

During the last 6 months, how often did you use the following digital technologies in your education classes? (do other researchers measure hours or times per week?)

Computer	Laptop	Tablet	Other
Never	Never	Never	Never
1 – 2 times a week	1 – 2 times a week	1 – 2 times a week	1 – 2 times a week
3 – 5 times a week	3 – 5 times a week	3 – 5 times a week	3 – 5 times a week
6 or more times a week	6 or more times a week	6 or more times a week	6 or more times a week

During the last 6 months, how often did you use digital technologies in your education classes to do any of the following (mark all that apply)?

- ☐ Create websites

- [ ] Edit images
- [ ] Contact family members
- [ ] Contact friends
- [ ] Complete application
- [ ] G.E.D. prep
- [ ] Find health information
- [ ] Find legal information
- [ ] Find parenting information
- [ ] Find reentry related information
- [ ] Find information on about how to manage money
- [ ] Find employment related information
- [ ] Listen to music
- [ ] Math
- [ ] Playing games (for example solitaire)
- [ ] Reading (for example an article or e-book)
- [ ] Sending emails
- [ ] Watch educational videos (for example on math, english, science, or social studies)
- [ ] Watch entertaining videos (for example action, comedy, sports, or suspense film)
- [ ] Write (for example an essay or a letter)
- [ ] Other (please specify): _____

Experience with digital technologies outside of class

Did you use any digital technologies anywhere besides a class in the last 6 months of your most recent incarceration?

Yes
No (if "No" go to Question x.)

During the last 6 months, where besides a class did you use digital technologies (mark all that apply)?

- [ ] The cafeteria
- [ ] The dayroom
- [ ] The library
- [ ] The unit
- [ ] The visitation room
- [ ] Other (please specify)

During the last 6 months, how often did you use the following digital technologies anywhere besides a class?

Computer	Laptop	Tablet	Other
Never	Never	Never	Never
1 – 2 times a week	1 – 2 times a week	1 – 2 times a week	1 – 2 times a week
3 – 5 times a week	3 – 5 times a week	3 – 5 times a week	3 – 5 times a week
6 or more times a week	6 or more times a week	6 or more times a week	6 or more times a week

During the last 6 months, which of the activities listed below did you use digital technology to do outside of an education class (mark all that apply)?

- [ ] Create websites
- [ ] Edit images

- [ ] Complete application
- [ ] Contact family members
- [ ] Contact friends
- [ ] G.E.D. prep
- [ ] Find health information
- [ ] Find legal information
- [ ] Find parenting information
- [ ] Find reentry related information
- [ ] Listen to music
- [ ] Math
- [ ] Playing games (for example solitaire)
- [ ] Reading (for example an article or e-book)
- [ ] Sending emails
- [ ] Watch educational videos (for example on math, English, science, or social studies)
- [ ] Watch entertaining videos (for example action, comedy or suspense film)
- [ ] Write (for example an essay or a letter)
- [ ] Other (please specify): _____

Thank you for your participation!