

Digital justice: Reflections on a community-based research project

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As technology use permeates many parts of society there are still groups where the penetration of technology is low, including: adults with little exposure to technology during their traditional learning years; users from lower socio-economic status (SES); and lower education levels; which has resulted in a digital divide between the digital haves and have-nots. In this study, Horton's cultural education, Freire's critical consciousness, and Eubanks's critical technology education provided the pedagogical lens to understand the importance of the critical learning process in digital education among non-traditional adult learners. The findings from the study support the concept of situated or contextual technology that seeks to increase the benefits of technology for adult learners while providing them the tools to manage complex digital environments through relatable instruction, user-centric design for technological tools and interfaces, and more robust government action through well-designed digital literacy programs that empower adult learners to take control of their own learning and thereby attempt to influence and shape the technology with which they interact.

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Introduction

The digital revolution heralded by an explosion in technology in terms of both affordability and range has brought about extraordinary change in many spheres of our lives with the World Wide Web playing a critical role in delivery of information to a wide swath of the population. Beyond the educational and work spheres, technology has also influenced the social, cultural, legal, and ethical aspects of our lives in recent years. Research has focused on the affordability and availability of technology as well as skills and abilities of users in acquisition of technology or the lack thereof that has resulted in a “digital divide.” While the rapid changes in our lives brought about by technology do not seem to slow down, the gap between those enjoying the benefits of the digital world and those who do not will only widen in the future (van Dijk, 2005; van Dijk, 2017; Warschauer, 2003). This is a recipe for a continuing and increasing inequality in all spheres of our lives where technology seems to play an increasingly larger role.

This community-based study is grounded on the premise that there needs to be equal opportunity to access and use of sources of critical information and knowledge in a democratic society. The goal being to enable citizens to make civic decisions, participate in representative government, and to share in the prosperity of the information age. Community-based digital learning initiatives have been researched extensively over the years (Eubanks, 2011; Lankester, Hughes, & Foth, 2018; Lin & Hsiu, 2017; Traxler, 2019; Warschauer, 2003) as a means of providing localized and contextual solutions to the digital divide problems among the more disadvantaged. These studies have centered the lived experiences of the participants in the context of their day-to-day lives (Freire, 1970/1996)—a concept that has guided this study’s participatory approach to investigating how non-traditional adult learners of digital technology relate technology in their own lives.

The research was conducted in three stages using the following mixed-methods participatory methodology: action research with photovoice, Group Level Assessment, and qualitative interviews. The intent was to answer the following research questions:

Q1: What is adult novice digital learners’ understanding of technology learning?

Q2: What constitutes their personal and professional agency in the digital skills learning process?

Q3: What is the role of conscientização or critical consciousness (Freire, 1970/1996) in the sphere of digital skills acquisition in terms of the obstacles they face and their thoughts on the actions that may ameliorate these obstacles?

In order to provide a framework to guide the research process, the terms “digital literacy” and “digital empowerment” need to be defined. One early definition of digital literacy available in the literature is “the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers and particularly, through the medium of the Internet” (Gilster, 1997, p. 1). While we see successive researchers arriving at a more in-depth definition (e.g., see Buckingham, 2007; Eshet-Alkalai, 2004), Warlick’s (2009) definition of 21st century literacy as involving “a range of skills to find, navigate, access, decode, evaluate, and organize the information from a globally networked information landscape” (p. 17) appeared succinct and applicable to this research project. The term digital empowerment represents a more expansive state and is defined as an individual learner’s ability to understand and apply digital skills in various spheres of their lives to fulfill economic

goals, to engage with the social and cultural aspects of the digital world for personal fulfillment if they so choose, and the ability to apply conscientização in interrogating the relationship between technology and inequality for a more just digital world (Chundur, 2016). A participatory research setting was an apt choice to examine the role of personal and professional agency in achieving conscientização, as learners come to perceive the contradictions in their own environments and seek to take action against unjust elements.

The location chosen was a community-based technology center located in a mid-sized midwestern city, that serves non-traditional learners seeking to enhance their digital skills, open to all, with little to no obstacles to enroll in terms of minimum skills requirement or cost. This community technology outreach center's mission is to improve quality of life for the people of the economically-depressed location where the center resides through offering introductory classes in digital technologies.

This paper will begin by presenting a literature review on the digital divide and then examine the integration of multiple theoretical frameworks underpinning the study. The paper will then detail the specific research methods used— photovoice, interviews, and group level assessment before discussing the results of the research methods and concluding with recommendations.

Digital divide in the literature

In 1995, with the World Wide Web in the early stages of development and personal computer ownership showing a brisk upward trend, the US National Telecommunications and Information Administration (NTIA) published a report titled “Falling Through the Net: A Survey of the “Have Nots” in Rural and Urban America” that first identified the fact that “disparities in access to telephone, personal computers (PCs), and the Internet across certain demographic groups – still exists and in many cases, has widened significantly” (National Telecommunications & Information Administration, 1995). While there exist conflicting reports on who coined the term “digital divide” and confusion on its usage (Warschauer, 2003), it has been widely used to represent a social phenomenon to describe the gap between those engaged with technology and those who were not.

A literature review of the digital divide often surfaces the following themes: access to technology, acquisition of technological skills, and usage of technology with prominence being attributed to the study of digital divide in terms of missed economic and political opportunities. A few researchers have looked beyond mere access and usage to study this phenomenon as a democratic and social justice issue to combat existing power structures. Mossberger et al. (2003) propose a broader definition of the problem as consisting of multiple divides: an access divide, a skills divide, an economic opportunity divide, and a democratic divide. The authors identify issues beyond access such as ability to use technology, naming it the skills divide which in turn perpetuates the inability of disadvantaged groups to leverage economic opportunity, as well as the opportunity to participate in the political arena. It is the latter two types of divide relating to economic opportunity and democratic participation representing equality of opportunity and democracy that marks the digital divide issue as a social justice issue and an important area of public policy (Mossberger et al., 2003).

DiMaggio et al. (2004) called to expand the focus of digital divide research from haves and have nots to the full range of digital inequity that considers equipment, autonomy, skill, support, and scope. Servon (2002) identifies access, information technology literacy, and relatable content as three dimensions of digital divide that need to be addressed in order to create holistic solutions that address underlying issues of inequality. Her approach to alleviating the digital divide as “part of a larger effort to address historic and deeply entrenched problems” (p. 21) resonates with the intent of this project as such an approach that contextualizes the phenomenon of the digital divide and provides a broader foundation to solve this multi-dimensional problem.

Fewer studies of the digital divide have considered the digital divide in terms of challenging existing power structures to promote social inclusion and democratic equality (Cushman & Klecun, 2006; Selwyn, 2004). Klecun (2008) prefers the term “digital exclusion” rather than digital divide as it captures the idea that digital exclusion compounds social exclusion. Klecun critiques technologically deterministic solutions to the divide as objectifying the non-technology users as the “Other” that further alienate them and reinforce their digital exclusion. Klecun’s conception of the digital divide as a social and political issue, rather than a developmental issue, helps in framing a definition of the term that acknowledges the missed political and social opportunities of novice technology users. Later work in the literature by Hur (2016), Njenga (2018), and Serrano-Cinca et al. (2018) have elaborated on the need for a more expansive definition of digital divide and its related concept of digital exclusion (Brown & Czerniewicz, 2010; Gangadharan, 2017). According to Kvasny (2005), the digital divide is a political outcome rooted in the historical systems of power and privilege. Systems that have excluded women, racial and ethnic minorities in terms of employment, housing, health, education, and consumption opportunities. Kvasny’s work at a community technology center, and her efforts to understand technology learning in the context of the life experiences of learners, provides a strong model for this research project that attempts to understand the underlying economic, socio-cultural, and political causes of the digital divide for learners at the community technology center that serves adult learners.

Many researchers have pointed to the underlying social inequality that may aggravate digital inequality. Kvasny (2006) states that “digital inequality is concerned with equitable access to the benefits derived from Internet and computer use. Digital inequality does not only reflect disparities in access to ICT; it also reflects ongoing social inequities in the US” (p. 161). Social inequities in the quality of education, work, consumption opportunities, and democratic participation are at the heart of digital inequality (Norris, 2001). Van Dijk (2005) conceives of digital divide as a social and political problem, rather than a technological problem, stating that the divide is “deepening where it has stopped widening” (p. 2). He also observes that where the question of access is being solved, the gaps in skills and usage show up as well--throwing light on prevailing social divisions as well as creating new inequalities. He shuns the dichotomous division of haves and have-nots as being too simplistic and speaks of digital divide in terms of “relative inequalities” (p. 4). Subsequent work by Eubanks (2011), van Deursen and van Dijk (2015) and van Dijk (2017) support the main assumption underlying this study: the benefits of the information revolution have not reached all sections of society even in advanced countries such as the United States. Digital inequality highlights both a social divide and a democratic divide that prevent parts of society from fully participating in the digital world. In response, a multi-dimensional study of digital divide (Barzilai-Nahoon, 2006; DiMaggio et.al 2004) is required that accommodates the lived experiences of disadvantaged learners.

A multi-theoretical framework for digital empowerment

Many scholars frame the concept of digital divide as a social justice issue (Duff, 2011; Eubanks, 2011) which focuses on a lack of digital skills that prevents the disadvantaged from reaping the benefits of the information revolution. Daniel Bell (1973/1999) prophesized that knowledge and information would supersede land, labor, and capital as the source of wealth and power, which would ultimately create its own inequalities. The complexity of this phenomena required a broad-based approach that could engage the different realms of this issue such as economic, socio-cultural, and political spheres of adult learners' lives. The critical pedagogies of Freire, Horton, and Eubanks have been used as a theoretical lens in this project to explore digital divide. A brief review of this integrated theoretical framework is provided below while a more detailed explanation for this theoretical framework has been found elsewhere in the literature (Chundur, 2016, 2017).

Technology education particularly for non-traditional learners needs to acknowledge them as historical beings, as Freire advocates. These learners are likely to have been left out of the benefits of the technological revolution, impacted by other socio-economic and age-related variables that affect their abilities to adapt to technological innovations. Freire coined the term "conscientização" to refer to an engaged learning process that provides the learner with the skills to perceive social, political, and economic contradictions in her life and to take action to overcome such contradictions. Applying Freire's concept of conscientização, or critical consciousness, in the field of technology education recognizes a dynamic and continuing cycle of action and reflection that can provide a true learning experience (Poveda Villalba, 2018). Critical consciousness is particularly important to digital learning as technology is constantly changing, due to improvements in hardware and software as well as due to market forces that guide its adoption and use. When learners use the lens of critical consciousness in technology learning they can understand how changes in technology impact their own lives and can identify and overcome oppressive elements of such changes through their actions.

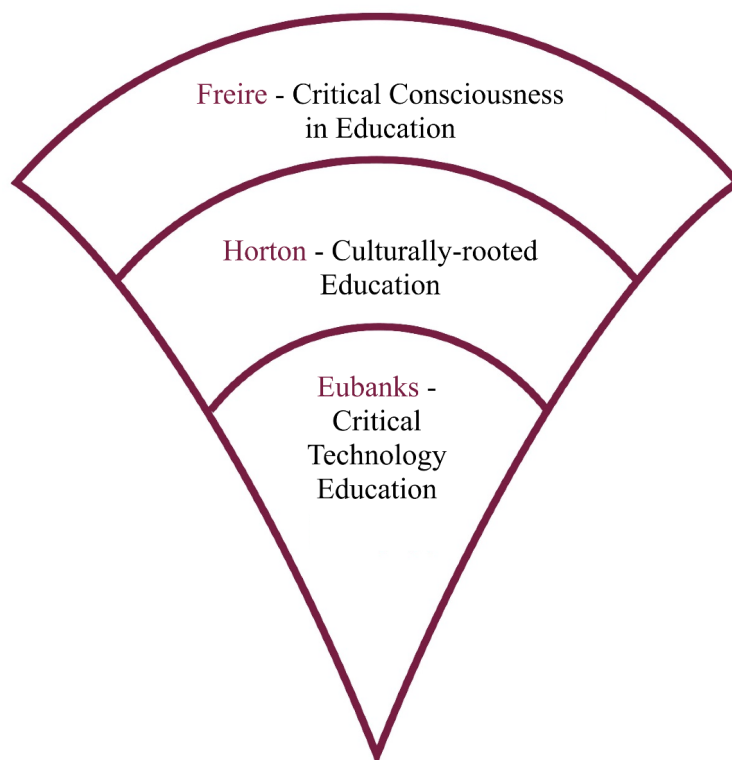
Myles Horton's cultural education is another critical pedagogy approach that has been used here. Horton's experience in establishing and running the Highlander Folk School (now the Highlander Research and Education Center) and its work in educating adults in the area in matters ranging from union organizing, to voting rights, and overcoming segregation is an example of how adult education can be directed to the current social and economic issues that are related to "situations that affect their total lives" (Horton, 2003). Digital literacy programs that aim to bridge the digital divide can similarly be strengthened if they provide an alternative perspective that speaks to the situations that affect the lives of the participants to help them identify with and perceive the value of digital knowledge as a means of empowerment in their lives--in addition to the knowledge to be acquired mainly for employment purposes.

Eubanks (2011) was deeply influenced by the ideas of Freire and Horton in her work with disadvantaged adult women leading her to coin the terms "popular technology education" and "critical technology education." As Eubanks found, the technology experience can be dehumanizing for persons not in a position of power where technology is used for surveillance and as a means of control. She calls for popular technology education based on three concepts: popular education proposed by Myles Horton based on the idea that knowledge grows from social experience and critical reflection, participatory action research that prompts social change through ordinary

people's analysis and action, and participatory design where people using software play a critical role in the design process.

The multi-theoretical framework provided by Freire, Horton, and Eubanks has been used as the lens of critical pedagogy in this three-stage research project process and has resulted in specific recommendations for an inclusive digital literacy policy to address the digital divide. Figure 1 represents and synthesizes this project's integrated theoretical framework as a model for the way forward in critical technology education:

Figure 1: Theoretical framework



Research methods and results

Participatory research methods have been used by Eubanks (2011) and Goedhart et al. (2019) to interrogate the concept of the digital divide among disadvantaged populations in community settings. As this project was also aimed at understanding the contextual and situational aspects of the acquisition of digital skills in a community technology center, a participatory action research-oriented approach with its emphasis on the liberatory and emancipatory aspects of education for social change (Freire, 1970/1996) best suited this study. Participatory action research methods such as photovoice, combined with specific qualitative research tools such as interviews, provided the flexibility to accommodate and value the time constraints of the participants while also providing ample opportunities to pursue the research questions. The three stages of research were:

1. Photovoice - A participatory action research method in which community participants use photography to identify and highlight the strengths and weaknesses of a community phenomenon (Wang, 1999). Photovoice is used as an action research tool that is part of the process of inquiry, reflection, and action (Lykes, 2006).
2. Participants from step 1 were interviewed using a semi-structured interview format providing a rich and comprehensive understanding of the phenomenon of digital divide. The content and nature of the questions in the interview were based on the data analysis from step 1.
3. The findings from step 1 and 2 were presented to participants for a Group Level Assessment (GLA), a participatory group level activity that enables participants to view and interact with the data, reflect on its meaning, and provide their perspective as feedback (Vaughn, Jacquez, Zhao, & Lang, 2011) as a group.

During the course of data analysis, Glaser and Strauss's (1978, 1987) grounded theory practice was adapted and modified in the following manner: simultaneous data collection and analysis through the three stages of research, using comparison at each stage, and analyzing the data in each stage using the project's theoretical framework. The results of the analysis were used to build a model of an ideal digital learning environment.

Participant information

The focus of the research project was to understand the digital divide among adult learners in disadvantaged groups. The criteria for deciding which locations should be included in the study included those which served non-traditional learners seeking to enhance their digital skills, particularly in community-based locations that were open to all with no minimum skills requirement or tuition charges involved. The research location that was finally selected out of the four different technology centers considered was a community-based "Tech-Reach" program at a local Catholic high school. This location offered courses in basic computer skills, Microsoft Office software skills, and basic Internet skills to working adults among the under-served population of an economically depressed area where the center was located.

The researcher attended many of the technology classes to understand how the center worked and how students engaged in the learning process, over a period of three months before beginning the recruitment process for the research project. A total of 7 individuals participated in the research project consisting of three stages: photovoice (5 individuals), interviews (7 individuals), and GLA (5 individuals), with many participating in 2 of the three stages of the research. All participants were over 21 years of age and were actively interested in furthering their digital skills for personal and/or professional development. Participants' educational backgrounds were diverse and included those seeking a GED, those with a high school diploma, and at least one with a college degree. The one common underlying characteristic among them all was the need to acquire more digital skills. During the participant orientation, the attendees were provided with background information on the research project.

Photovoice

Description and application

The participants were given the following photovoice guidelines for taking/interpreting the photographs/images as follows (Wang, 1999):

S- What do you SEE? (Observation)

H- What is really HAPPENING? (Interpretation)

O- How does this relate to OUR lives? (Contextualization)

W- WHY does this problem/condition exist? (Politicization)

E- How could this image EDUCATE policymakers/decision makers? (Action)

D- What can we DO about it? (Action)

The participant group met after the agreed-upon time to take the photographs. The group decided that each participant would select 5 photographs representing important benefits, drawbacks, or significant aspects of their own digital learning experience and speak about their thoughts on the selected photographs, as this would provide a more focused discussion. After each participant's presentation, the group discussed main ideas and shared experiences with each other exchanging their different perspectives. The transcript of the focus group discussion on the photographs was analyzed for initial coding. The main themes were identified by reviewing the coding along with the photographs.

Photovoice results

The subjects of the photographs taken by the group and presented for discussion show a range of phenomena and issues that the group considered to be important, including from concrete problems such as safety and privacy issues to pressure from outside forces such as marketing pressures and transition/change due to changes in technology. While the group acknowledged the many benefits of digital resources there was also a recognition of the complexities that novice digital users confront and have to overcome. The most fascinating theme was "cultural transformation." This was an *in vivo* theme, coined by one participant and enthusiastically supported by other participants. The participant group showed an awareness of the larger, more intangible issues involving digital technology that affect their lives in many ways. This included taking a critical view of how certain practices and behaviors were triggered and encouraged by the digital revolution and how they affect society at large. Table 1 presents the major themes identified in the analysis of photovoice data and their mappings to the research project's integrated theoretical framework, along with some of the individual participant comments that exemplify these themes.

Table 1: Major themes of photovoice research stage

Themes	Comments	Applicable Theoretical Concepts
Cultural Transformation	<ul style="list-style-type: none"> • Interaction <ul style="list-style-type: none"> ○ Interruption to family time ○ People not calling nowadays (FB/text) ○ “Preoccupied with themselves” • Addictive • “Takes away from what is really important” • “I need every bit of energy I have to live in the 3D world. Don’t have any to spare for digital world” • “So many devices. Put one down and pick up another” 	Presence/Absence of agency
Privacy	<ul style="list-style-type: none"> • Wearable tracker devices – health related <ul style="list-style-type: none"> ○ Affects insurance coverage and are also an infringement on privacy HIPPA • Others posting your pictures on media • Permanence of information on the Internet • Easy to search for information on people • No expectation of digital privacy at work 	Absence of agency
Complexities of Digital Life	<ul style="list-style-type: none"> • “Mastery of technology” – achievable? • Having to re-learn complex tech – Ex dashboard of newer cars • Difficulty accessing customer service due to automated voice systems • Difficulty manipulating advanced features of smart phones • Difficulty using apps such as Kindle, iCloud 	Lack of empowerment/Absence of agency
Safety/Security	<ul style="list-style-type: none"> • Physical safety • Driving while texting • Digital safety • Personal health records/personal financial records 	Lack of empowerment/Absence of agency
Transition/Change	<ul style="list-style-type: none"> • Change forced upon us due to acceleration of technology (flip phone to smart phone) • Smart TV – time and technical knowledge required to figure out • Interfacing and compatibility issues due to multiple pieces of technology 	Lack of empowerment/Absence of agency
Marketing	<ul style="list-style-type: none"> • Little choice – users pushed into upgrades • Contextual/situational marketing based on browsing patterns • Selling more products to consume – may not be necessary 	Role of conscientização
Digital Resources/Benefits	<ul style="list-style-type: none"> • Ability to look up “how to” on any topic on YouTube • QR Code – useful but not available to non-smartphone owners • Library resources – downloadable • GPS on smartphones • Easier shopping – coupons online, information online • Useful apps, such as Skype “Creates a visual connection with family faraway” 	Conscientização

Participants’ photographs/discussions have generated themes that highlight benefits along with many challenges. For example, the theme “privacy” was generated from a discussion based on participants’ photographs showing how data about them may be collected by agents outside their control, resulting in a loss of privacy. One photograph showed a wearable tracker device that monitored the health of the device owner. The group discussed the possible repercussions if insurance companies and others gained access to their health data. Another photograph captured a person searching Facebook for information about her colleagues, which led to a discussion on the loss of privacy due to social media. While these two photographs formed part of the discussion on the

theme of privacy, a detailed discussion of how other themes were generated can be found elsewhere (Chundur, 2016).

The three themes: “complexities of digital life,” “safety/security,” and “marketing” demonstrate participants’ lack of empowerment and inability to act. For example, the “safety/security” theme primarily highlights participants’ experiences with having little to no control over their personal or financial information in the digital world. This lack of empowerment or agency may be attributable to rapid changes in technology as well as to participants’ lack of awareness or knowledge of how to manage the changes that directly affect their lives. The “marketing” theme also highlights the market forces that exist beyond participants’ control pushing them into products/services that they do not need. The overall picture of digital technology uses show benefits for various groups of users. However, users with higher education, skills, and other forms of social and cultural capital appear to benefit more than users with lower levels of education. This imbalance in diffusion of digital benefits merely leads to a perception of disempowerment and a lack of agency in the case of the participants who are novice digital learners.

The photovoice/discussion data that represent the theme, “complexities of digital life” highlight non-traditional digital learners’ challenges with technology in their everyday lives signifying disempowerment. One participant raised the question of her inability to attain mastery over technology. This comment encapsulates the tensions between an older way of thinking about employment where mastery of specific skills was required for a job and the current expectation of a fluid job market that requires different skills at different points of time with the only common denominator being the ability of the employee to adapt to newer technologies. The “privacy” theme permeates the personal as well as the professional realm as participants grapple with how to maintain their privacy in a world of multiple social platforms driven by users’ private information posted voluntarily. Navigating a digital world that is seemingly free of financial cost but with a high cost to privacy requires continuing vigilance and a high level of critical awareness.

Participants’ comments about changes that technology has brought to their lives as shown in Table 1 lead to the identification of the “transition/change theme. The speed of technological innovation presents unique challenges in these users’ personal lives whether it is keeping up with changes in cell phone technology or the usage of multiple devices that give rise to interfacing problems. Here again, the need to constantly keep up with changing technology indicates a lack of agency for users. Finally, the theme of “cultural transformation” represents a wide-ranging commentary and critique of the effects of digital technology in their personal, professional, and social lives.

The results of stage one of the research project turned the spotlight on the tensions apparent in participants’ experiences with technology as a useful tool, while highlighting the multiple challenges participants faced due to the complexities of technology. The work of resolving these differences and building upon the theory constructed in this stage of the research focused on gaining a fuller picture of the phenomenon of digital divide and digital learning, which was also continued in stage two and stage three of the project.

Interviews

Description and application

The intent of the interview stage of research was to highlight any gaps that may exist in the photovoice data analysis and examine specific technology experiences that may influence each participant’s perceptions of technology that were not discovered in the previous stage of the research. The interviews were 60-90-minute single, in-depth semi-structured interviews with each of the seven participants. The questions started with gathering information about the interviewee’s experiences and progressed towards a more open-ended format with interviewees asked to elaborate on their answers or speak on related topics that were not initiated by the interviewer.

Interview results

The data analysis of interviews indicated that though there were some aspects of the individual experiences that were captured by the interviews, many of the vignettes shared by participants included more details about the themes generated in the photovoice research. Hence, the data generated by the interviews provided a more comprehensive and rich description of the phenomenon of the digital divide, as experienced by the participants.

Table 2 shows the interview transcript analysis with an overall view of the categories generated from the interview transcripts as a result of coding.

Table 2: Main categories from personal interviews

Concerns		Usage	Tech Learning	
Concrete	Socio-cultural		Approaches	Impediments
<ul style="list-style-type: none"> • Children <ul style="list-style-type: none"> ○ Safety ○ Boundaries ○ Family time • General <ul style="list-style-type: none"> ○ Data Security ○ Data backup ○ Safety of financial transactions ○ Different ways of doing ○ Eliminating jobs 	<ul style="list-style-type: none"> • Frustrations • Addiction • Replacing human interaction • Fear of cultural change • Loss of language of description • Generating a culture of ADD/ADHD • Feelings of helplessness • Drawing energy away from physical life • Discomfort • Takes away personality • Lost in translation 	<ul style="list-style-type: none"> • Access of information • Entertainment • Professional development • Job search • Applying for jobs • Staying in touch • Tool of empowerment • Tool to overcome disabilities • Tool to overcome language barrier 	<ul style="list-style-type: none"> • Seeking help from <ul style="list-style-type: none"> ○ others ○ Internet ○ help button ○ Start over • Learn to not be afraid • Preferred in small groups • To not be treated as stupid • Refresher classes • Practice • Motivation/drive • “You need to want to do it” • “Embrace Failure” (in vivo) 	<ul style="list-style-type: none"> • Needing to learn slowly • Tech moving too fast • Less advantaged not prepared • Time consuming • Extensive job application process • Tech requirements for entry level jobs • Fear of going back to work after a break • Time limits in library • Poor connectivity at home

To illustrate an example of how a category was derived from the interview data, interviewees were generally concerned about the permanence of their data on the internet with phrases, such as “data never going away,” “being caught in a data breach,”

“safety of shopping online,” and “reliability of financial transactions” online. These phrases representing various vignettes narrated by the interviewees, formed the basis for the concrete concerns’ category listed in Table 2. A detailed analysis of how other categories were derived by interview data can be found elsewhere in published literature (Chundur, 2016).

Mapping connections between Photovoice themes and personal interview categories

The broad categories gathered from the personal interviews were mapped to themes identified in the photovoice stage of the research, which showed connections and patterns between the themes from stage one of the research process and categories from stage two of the research process. Below is a discussion of some of the mappings between the two stages of research while a more detailed set of mappings are discussed elsewhere in literature (Chundur, 2016).

The concerns of participants in the interview stage, such as concern for safety, data security, and data backup can find echoes in the themes of “privacy,” “safety/security,” and “change” as represented by some of the discussions in the photovoice stage. The safety of health and financial transactions online was discussed in the photovoice session and was elaborated upon by many participants in the interviews. The category of “socio-cultural concerns” is reflected in many of the issues voiced under the “cultural transformation” theme in the photovoice discussions. The comments in the photovoice discussion such as, “addictive,” “takes away from what is really important,” “I need every bit of energy I have to live in the 3D world,” have been mirrored and extended in the interviews. In following up the theme of “cultural transformation” from stage 1 with the interviewees it was found that they had ideas that portrayed their perceptions, including “addiction,” “replacing human interaction,” “loss of language of description,” “feelings of helplessness,” “drawing energy away from physical life,” and “takes away personality.” These social and cultural concepts brought out through interviews helped provide a nuanced view of individual experiences in this realm while also falling under the broad theme of “cultural transformation” identified in the photovoice stage of research.

Participants highlighted benefits of digital resources in both stages of research, such as the particular ways in which participants used the internet, including as a tool to overcome disabilities, to overcome a language barrier, and as a job-search tool. However, in the mapping of the category of “impediments to learning” in the interview stage to the theme of “complexities of digital life” in the photovoice stage, participants identified very specific issues that were problematic for them in the realm of digital learning, such as: difficulty with automated systems, trouble with advanced smartphones, and more specific issues such as poor Internet connectivity. Additionally, there were very precise comments on impediments, such as “needing to learn slowly,” “technology moving too fast and less advantaged not prepared,” and “fear of going back to work after a break” that speak to participants’ experiences of the obstacles they face.

In the area of technology learning, “approaches to learning” was a category that revealed important, individual attitudes to technology learning that were not put forward during the photovoice discussion. Phrases such as “learn to not be afraid,” “you need to want to do it,” “embrace failure,” and “need motivation/drive” highlight important

meta-cognitive, critical consciousness on the part of participants that may be important for their learning.

While many of the concerns expressed in the interview stage could be mapped to the themes of the photovoice stage of research, the narration of specific experiences of individual participants provided a rich and in-depth picture of technology use in their lives in its many facets. The descriptive nature of the interview data also helped in identification of categories representing more specific and, in some cases, concrete concerns under the general umbrella of the photovoice themes.

Group level assessment

Description and application

The third and final stage of research brought the participants together for a Group Level Assessment (Vaughn & Lohmueller, 1998, 2014) to reflect on their group and individual concerns, perceptions, and experiences on the phenomena of digital divide and digital literacy. GLA, a participatory, data-generation tool, is useful in generating timely and valid data collaboratively for evaluation or needs-assessment purposes. In the context of this research project, GLA was used in the third stage of research, extending the research findings from the earlier two stages by providing space for participants to collaboratively identify needs and issues in the digital realm, that were relevant to them.

Five of the seven participants from the interview stage participated in the GLA. A modified version of the GLA process (Vaughn et al., 2011) was followed in this stage of research with the participants being taken through the following steps:

1. Climate Setting – an overview of the GLA process was provided followed by a small warm-up exercise.
2. Generating – the group worked at responding to prompts written on flip charts placed around the room.
3. Appreciating – the group looked at data written on the wall charts.
4. Reflecting – participants spent time alone thinking about what the data means.
5. Understanding/Integrating – the researcher facilitated discussion with the group to understand the prompts and responses.
6. Selecting – the group prioritized data and identified main themes.
7. Action – based on the previous steps, the group determined actions that can be taken by individual users as well as recommendations for institutions/government to improve the digital learning process.

Based on the initial analysis of data from the photovoice and interview stages of the research, the prompts for the GLA stage were generated. The questions were a mix of direct questions and open-ended, semi-structured questions to provide participants a flexible forum for the exchange of ideas and generation of themes. The prompts were written on flipcharts and placed along the walls of the room. Participants were first asked to walk around the room, view, and enter their comments on individual questions in the sheets. Subsequently, participants viewed responses from all participants to the prompts and spent a few minutes reflecting on their readings.

GLA results

Table 3 provides a few GLA prompts and some of the participant responses for each of these prompts:

Table 3: GLA prompts and responses

GLA Prompts	Participants' Comments
What are digital skills?	a. "Adding my skills to technology (Often it is not a hand in glove (poor fit))" b. "Everything is digital: such as banks, stores, food, water, gas" c. "Anything involving technology, knowing/learning how to use computers etc."
When I work with technology at the work place I feel.....	a. "Having to learn whole new way – feeling intimidated at times –can I figure out by self or have to keep asking and how does that make me look to supervisors, fellow workers especially younger ones" b. "Upset because many of my peers come in with technological skills and no experience while I come in with experience and no technological skills. Perhaps the 2 could mesh" c. "Empowered: I can successfully do what I was hired for. Frustrated when the Internet is down, I can't do anything!"
The main difficulties I face when working with technology are....	a. "Not able to ask a human - questions when I don't understand. Ex. applications online" b. "I get frustrated because I am alone" c. "when walking into SS office – no signs anywhere – no people at that instant-just a screen – felt idiotic"
When I have difficulties with technology, I feel....	a. "Angry, upset" b. "Intimidated/helpless/frustrated" c. "Get it right/not to give up" d. "Sometimes overly motivated to learn, sometimes not" e. "Hopeless, I want to give up and do things the old-fashioned way"
I can pinpoint structural problems in how adults learn to use technology such as...	a. "They were not raised with it; it's totally new and foreign to a lot of older (and not so old!) adults" b. "Things happen too fast. Technology doesn't have much of a 'muscle memory' component" c. "There isn't just one way of doing anything->word, excel, etc. This can be overwhelming and cause some to give up" d. "Technology is hard to use and if you don't learn it as soon as it comes out you are behind for a while until a new way comes out"
My feelings about rapid changes in technology....	a. "Some are good, some are not (changes are too much)" b. "As technology changes, it ought to build in that many of us did not grow up with the www nor did we have parents that stressed education (perhaps technology ought to have tiers) advanced, intermediate, beginning" c. "Not happy. I am upset that everything is becoming based on technology. Although I think some things will be better on technology as well" d. "Sometimes moves in better technology are too fast to keep up with across the board and is sometimes difficult to figure out"

	what is best for you. Some people talk to you like you are an ‘idiot’ because you forgot something. That’s demeaning.”
I believe I can learn better if...	<ul style="list-style-type: none"> a. “In a hands-on interactive environment” b. “Hands-on, smaller class size, class is controlled so someone doesn’t take over class” c. “Hands on learning works best for me. Also, small class sizes with a class full of people who want to learn vs people in high school who just have to be there” d. “clear head, lots of rest and time”

In the discussion that followed, the group progressed through the GLA process while viewing and reflecting on the prompts, understanding, and analyzing the generated data through discussions and arriving at the final condensed themes: “contextual instruction,” “awareness of diversity,” “learner traits,” and “satisfaction of basic needs of learners.” For example, identification of the “learner traits theme was generated through the group’s understanding that each learner was unique in their own way, bringing to the table the set of experiences that shaped them.

The progression of the group from identification with applications of technology in their own lives and how their learning can be improved through personal agency (attitudes, personal life circumstances), as well as through institutional/teaching methodological improvements (non-judgmental, relatable teaching) situated in context (awareness of racial, cultural, and ethnic differences), exemplifies a process-oriented approach of understanding and integrating the results of the GLA. Through GLA, the participants explored what Freire calls the “dimensions of a totality” (Freire, 1970/1996, p.122) rather than a “focalized view” of the problem.

Integration of themes and categories from three stages of research

Table 4 provides the photovoice themes, interview categories, and GLA themes and forms the basis for the mapping process explained in the sections below:

Table 4: Themes and categories across the research stages

Photovoice Themes	Interview Categories	GLA Themes
<ul style="list-style-type: none"> • Cultural Transformation- In vivo • Privacy • Complexities of Digital Life • Safety/Security • Transition/Change • Marketing • Digital Resources/Benefits 	<ul style="list-style-type: none"> • Concerns <ul style="list-style-type: none"> ○ Concrete ○ Socio-cultural • Usage • Tech Learning <ul style="list-style-type: none"> ○ Approaches ○ Impediments 	<ul style="list-style-type: none"> • Contextual instruction • Awareness of diversity • Learner traits • Satisfaction of basic needs

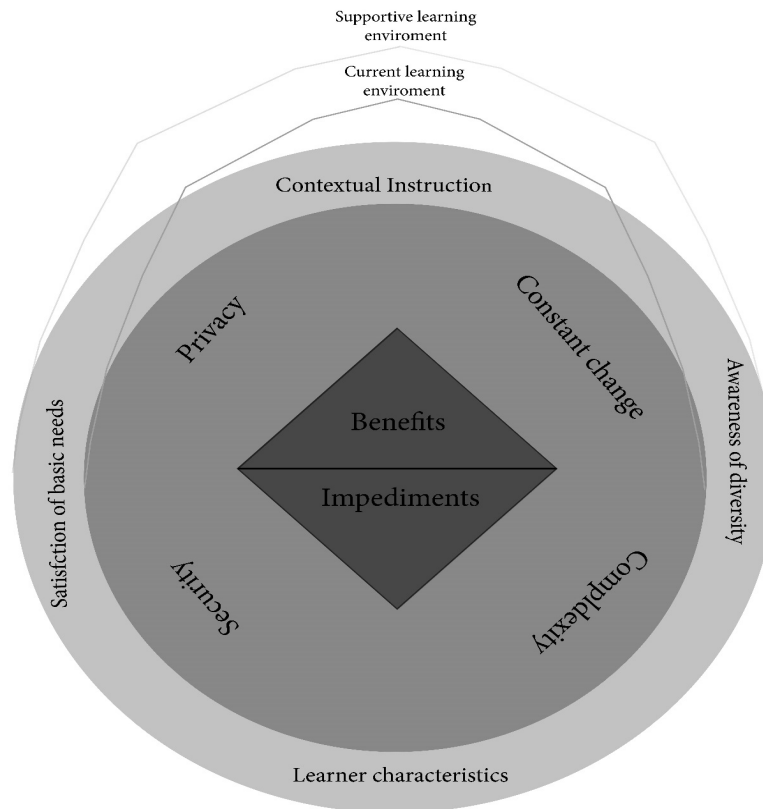
Some of the mappings between the three stages of research were more easily identified. For example, the theme “safety/security” in the photovoice stage was reflected in the “concrete concerns” category of the interview stage—with the identification of “contextual instruction” in the GLA stage acting as a possible solution to such issues. Other themes such as “cultural transformation” in stage 1 mapped to “socio-cultural concerns” in stage 2, which included “addiction,” “fear of cultural change,” “feelings of helplessness” that were in turn leading to identification of “alleviation measures,” such as better instruction based on the “learner traits” and “contextual instruction” themes in the GLA stage.

There were also threads that could be tracked from the “transition/change” and “complexities of digital life” themes to specific concerns in the interview categories such as “changes to workplace,” “elimination of jobs,” and “need to learn newer ways of working with technology.” Again, the GLA stage themes such as “awareness of diversity,” “learner traits,” and “contextual instruction” were identified as means of dealing with “transition/change” and “complexities of digital life.” On the more positive side, the theme of “digital resources/benefits” directly mapped to “technology usage” category in the interview stage, as these constructs reflected the positive aspects of technology identified by the participants.

The results of data analysis of the three-stage research process enabled the researcher to distill the many themes and categories generated into two major categories: (1) the benefits of technology and (2) impediments to its use that adult users experience in an environment. These were mediated by the following structural characteristics of the digital environment: constant change, complexity of technology use, privacy issues, and security issues. In this setting, participants’ identification of the factors that can improve their learning have been condensed to contextual learning, instructional approaches that are aware of learner characteristics, as well as diversity of learners. These constructs are placed within a framework where the basic needs of the learners need to be met to

prepare them to learn well. Figure 2 encapsulates the results of the grounded theory approach to the analysis of the three stages of research:

Figure 2: Digital learning model



Throughout the research process, participants acknowledged the clear benefits of technology as well as the impediments that affected their digital learning. Thus, the inner circle in the figure above is the current digital environment, mediated by concerns of privacy, complexity, security, and change, within which the adult digital learners enjoy the benefits, as well as work to overcome impediments. The proposed theory is grounded upon the research findings that the digital learning environment can be made more supportive to novice digital learners with instruction that is contextual, aware of learner diversity and learner characteristics, and acknowledges that the basic needs of the learner need to be met before meaningful learning can happen. The outer circle is the proposed support system that can be built around the existing digital environment to help users navigate the digital world with personal and professional agency.

Recommendations for action

The approach to managing the complexities of technology can be two-fold: relatable training and critical education. Educational and community organizations that provide

digital skills to novice users can provide more contextual instruction. Coming to technology later in their lives, adult learners may benefit from a more relatable teaching and learning approach to help them make lasting connections to digital knowledge. Hence, the concept of situated learning (Brown, Collins, & Duguid, 1989) can be used to teach technology, situated in the context in which users live and work as this would create a more authentic learning experience that is meaningful to the learners. Situated technology learning experiences could help alleviate concrete concerns of technology users (Interview stage) with regards to specific privacy and security issues (Photovoice stage) through contextual instruction. For example, many research participants mentioned using the internet to search for information. One authentic situated learning task would be to assess the reliability of information on the web. Given a task to search for information on a topic of their personal interest, learners can then be guided through the process of evaluating the trustworthiness of the information with criteria such as assessing the credibility of the organization hosting the website, the currency of the information, additional resources provided by the website together with evaluating the advantages and drawbacks of using information clearing-houses such as Wikipedia. Another important aspect of adult technology learning is acquiring the skills to manage the complexity of digital life (photovoice stage). Organizations that teach digital skills to novice users can provide more contextual instruction, i.e., specific, grounded skills in evaluating technology, the role of technology in public and private life, as well as hands-on instruction in how to manage specific privacy, safety, and security threats.

Another recurrent theme in the data analysis stage was the issue of security of financial information indicating a common concern among novice adult digital learners. Instructors could use a test case and demonstrate the various measures that a user can adopt in order to protect herself from theft of financial data that may range from reading the privacy policy of the financial institution to specific actions such as choosing a strong password, never writing down the password on a piece of paper, and never giving out the password to any other person. An additional authentic activity would be to ask learners to research ways by which they can recover their data in case of a breach of their financial data. Such an activity would encourage critical thinking skills vis-à-vis technology and a sense of personal agency. It is to be noted here that such activities place the learning within the context of users' technology experience while also promoting critical thinking on the strengths and concerns of technological applications that they use. Due to the changing nature of technology, the nature of security and privacy threats also evolve, and authentic learning tasks need also to be reviewed and revised accordingly.

User-centric design of digital interfaces would help novice users to a large extent in managing the complexities of their digital life, a category identified in the photovoice stage of research and would also help manage the concrete concerns of safety and data security identified in the interview stage of research. In particular, such design approaches to information systems associated with social welfare programs, employment programs, and health services can have a huge impact on disadvantaged citizens who access such programs. Approaches such as Norman and Draper's (1986) "user-centered design" and Schuler and Namioka's (1993) "participatory design" provide design methodologies that involve engaging the end-users extensively throughout the software development process. These approaches can lead to more user-friendly information systems, particularly those that affect human welfare, livelihood, and health accessed by users who do not possess sufficient technical knowledge to navigate complex systems. Such a participatory process would fall within the realm of

critical technology education proposed by Eubanks. It would also help learners value the benefits of digital technology while also providing a sense of empowerment as they participate in the design process that help them overcome barriers to use these systems and make them more user-friendly.

Congressional action through legislation together with rules published by governmental agencies has encouraged universal access and inclusive design in the United States for people with disabilities through section 508 of the Rehabilitation Act of 1973. Additionally, the World Wide Web Consortium (W3C) – an international organization which is a collaborative effort among the international technology community and the public – has created the Web Accessibility Initiative to develop strategies, guidelines, and resources to make the web more accessible for users with disabilities. Such initiatives for people with disabilities could be a model for technology interface design for disadvantaged adult learners who lack the skills and knowledge to navigate the Internet and other complex digital platforms.

The recommendations listed in this section address specific concerns raised by participants during the research process and also emphasize a transformative and critical pedagogical approach to technology learning (Eubanks) that is rooted in the learners' lives (Horton) and provided a critical education experience (Freire) that can be sustained by learners throughout their lives.

Limitations and implications for research

The research participants represent a small set of adult learners who have enrolled in adult digital literacy classes and, as such, they do not represent the entire range of adult learners with their own specific backgrounds and histories. The nature and process of participative research as well as the time constraints of this project precluded the possibility of recruiting a large number of participants across a range of adult demographics. This is a feature rather than a limitation of this research, as the focus on a small number of participants in one location helped create a collaborative and participatory learning experience for the group. Individual user experiences were drawn together to sketch a larger picture of the status of digital divide and digital literacy applicable to a particular demographic of participants with the larger themes transferable to similar environments. Additionally, repeated interactions with the same participants in three consecutive stages of the research resulted in the collection of rich snap-shots of participant experiences using three different lenses.

The digital divide and digital literacy are wide-ranging in nature resulting in some of the recommendations for action and future research being necessarily very broad. The expectation is that there will be continued interest and research efforts on each strand of the findings such as contextual digital instruction, user-centric design, management of digital complexity, as well as the role of government action in moving the digital world towards a more inclusive environment, allowing for users holding varying technical skill levels to find personal, professional, and social value in the digital world.

Conclusion

Technology advancement has provided real benefits in the personal, social, and professional lives of its users, while also creating an environment where there is constant need to catch up with its explosive advancement. Users without a solid

educational foundation struggle with the “keeping up.” Despite the rhetoric regarding the empowering nature of digital skills, it is technology situated in the socio-cultural context of the users’ lives that has the most enduring impact, resulting in lasting knowledge to help negotiate the digital world.

Adapting the ideas of Freire and Horton, there needs to be a concerted effort to provide a more holistic learning experience for adult digital learners, embedded in their social and cultural contexts where learners do not feel that they are merely consumers of knowledge but that they have the tools to critically evaluate and consume technology. Eubanks’s call for a popular technology education to develop critical consciousness aiming for equity, justice, and critical technological citizenship is a good starting point in designing effective community technology programs.

By leveling the digital playing field through critical technology education, it is possible that the digitally-disadvantaged may be able to participate in the digital world and reap some of the benefits of technological innovation.

References

- Barzilai-Nahoon, K. (2006). Gaps and bits: Conceptualizing measurements for digital divide/s. *Information Society*, 22(5), 269–278. doi:10.1080/01972240600903953
- Bell, D. (1999). *The coming of post-industrial society: A venture in social forecasting*. New York: Basic Books. (Original work published 1973)
- Brown, C., & Czerniewicz, L. (2010). Debunking the ‘digital native’: beyond digital apartheid, towards digital democracy. *Journal of Computer Assisted Learning*, 26(5), 357–369.
- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32–41.
- Buckingham, D. (2007). Digital media literacies: Rethinking media education in the age of the Internet. *Research in Comparative and International Education*, 2, 42–55.
- Chundur, S. (2016). *Digital literacy: Beyond the rhetoric of economic empowerment* (Doctoral dissertation, University of Cincinnati).
- Chundur, S. (2017, March). Digital equity through a social justice lens: A theoretical framework. In *Society for Information Technology & Teacher Education International Conference* (pp. 1385–1393). Association for the Advancement of Computing in Education (AACE).
- Cushman, M., & Klecun, E. (2006). How (can) nonusers engage with technology: Bringing in the digitally excluded. In *Social inclusion: Societal and organizational implications for information systems* (pp. 347–364). Boston, MA: Springer.
- DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). From unequal access to differentiated use: A literature review and agenda for research on digital inequality. *Social Inequality*, 1, 355–400.

- Duff, A. S. (2011). The Rawls-Tawney theorem and the digital divide in postindustrial society. *Journal of the American Society for Information Science & Technology*, 62(3), 604–612.
- Eshet-Alkalai, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, 13, 93–106.
- Eubanks, V. (2011). *Digital dead end: Fighting for social justice in the information age*. London, England: The MIT Press.
- Freire, P. (1996). *Pedagogy of the oppressed*. London, England: Penguin. (Original work published 1970)
- Gangadharan, S. P. (2017). The downside of digital inclusion: Expectations and experiences of privacy and surveillance among marginal Internet users. *New Media & Society*, 19(4), 597–615.
- Glaser, B. G. (1978). *Theoretical sensitivity: Advances in the methodology of grounded theory*. Mill Valley, CA: Sociology Press.
- Glaser, B. G., & Strauss, A. L. (2009). *The discovery of grounded theory: strategies for qualitative research*. Chicago, IL: Aldine Publishing Company. (Original work published 1967)
- Gilster, P. (1997). *Digital literacy*. New York, NY: Wiley Computer Publishing.
- Goedhart, N. S., Broerse, J. E., Kattouw, R., & Dedding, C. (2019). ‘Just having a computer doesn’t make sense’: The digital divide from the perspective of mothers with a low socio-economic position. *New media & society*, 21(11-12), 2347–2365.
- Horton, M. (2003). *The Myles Horton reader*. D. Jacobs (Ed.). Knoxville, TN: The University of Tennessee Press.
- Hur, M. H. (2016). Empowering the elderly population through ICT-based activities. *Information Technology & People*, 29(2), 318–333.
- Klecun, E. (2008). Bringing lost sheep into the fold: Questioning the discourse of the digital divide. *Information Technology & People*, 21(3), 267–282.
doi:10.1108/09593840810896028
- Kvasny, L. (2005). The role of the habitus in shaping discourses about the digital divide. *Journal of Computer-Mediated Communication*, 10(2).
doi:10.1111/j.1083-6101.2005.tb00242.x
- Kvasny, L. (2006). Cultural (re)production of digital inequality in a US community technology initiative. *Information, Communication & Society*, 9(2), 160–181.
- Lankester, A., Hughes, H., & Foth, M. (2018). Mapping a connected learning ecology to foster digital participation in regional communities. In *Digital Participation through Social Living Labs* (pp. 141-171). Chandos Publishing.
- Lin, Y., & Hsiu, W. W. (2017, November). Bridging the digital divide with information technology in Taiwan: A community and public policy approach. *In 2017*

- Pacific Neighborhood Consortium Annual Conference and Joint Meetings (PNC)* (pp. 8–14). IEEE.
- Lykes, M. B. (2006). Creative arts and photography in participatory action research in Guatemala. *Handbook of action research*, 269–278.
- Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Washington, D.C: Georgetown University Press.
- Njenga, J. K. (2018). Digital literacy: The quest of an inclusive definition. *Reading & Writing*, 9(1), 1–7.
- Norman, D. A., & Draper, S. W. (1986). *User centered system design*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the internet worldwide*. Cambridge, United Kingdom: Cambridge University Press.
- Poveda Villalba, S. C. (2018). A psychosocial analysis of development outcomes: a digital literacy case study in Myanmar. *International Development Planning Review*, 40(3), 273–297.
- Schuler, D., & Namioka, A. (1993). *Participatory design: Principles and practices*. Hillsdale, N.J: L. Erlbaum Associates.
- Selwyn, N. (2004). Reconsidering political and popular understandings of the “digital divide.” *New Media & Society*, 6(3), 341–362. doi:10.1177/1461444804042519
- Serrano-Cinca, C., Muñoz-Soro, J. F., & Brusca, I. (2018). A multivariate study of internet use and the digital divide. *Social Science Quarterly*, 99(4), 1409–1425.
- Servon, L. J. (2002). *Bridging the digital divide: Technology, community and public policy*. Malden, MA: Blackwell Publishing.
- Strauss, A. L. (1987). *Qualitative analysis for social scientists*. Cambridge University Press.
- Traxler, J. (2019). Only connect: indigenous digital learning. *Interaction Design and Architecture(s)*, 41, 7–23.
- National Telecommunications & Information Administration. (1995). *Falling through the net: A survey of the “have nots” in rural and urban America*. Retrieved from <http://www.ntia.doc.gov/ntiahome/fallingthru.html>
- van Deursen, A. J., van Dijk, J. A., & Peter, M. (2015). Increasing inequalities in what we do online: A longitudinal cross sectional analysis of Internet activities among the Dutch population (2010 to 2013) over gender, age, education, and income. *Telematics and informatics*, 32(2), 259–272.
- van Dijk, J.A.G.M. (2005). *The deepening divide: Inequality in the information society*. London: Sage.
- van Dijk, J. A. (2017). Digital divide: Impact of access. *The international encyclopedia of media effects*, 1–11.

- Vaughn, L., Jacquez, F., Zhao, J., & Lang, M. (2011). Partnering with students to explore the health needs of an ethnically diverse, low resource school. *Community Health, 34*(1), 72–84.
- Vaughn, L. M., & Lohmueller, M. (1998). Using the group level assessment in a support group setting. *Organization Development Journal, 16*(1), 99–104.
- Vaughn, L. M., & Lohmueller, M. (2014). Calling all stakeholders group-level assessment (GLA)—A qualitative and participatory method for large groups. *Evaluation review, 38*(4). 336–355. doi:10.1177/0193841X14544903
- Wang, C. C. (1999). Photovoice: A participatory action research strategy applied to women's health. *Journal of Women's Health, 8*(2), 185–192.
- Warlick, D. F. (2009). *Redefining literacy 2.0* (2nd ed.). Columbus, Ohio: Linworth Publishing.
- Warschauer, M. (2003). *Technology and social inclusion: Rethinking the digital divide*. Cambridge, MA: MIT Press.