Title: Community-Led Digital Literacy Training: Towards a Conceptual Framework

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Community-Led Digital Literacy Training: Towards a Conceptual Framework

Abstract

An exploratory study investigated the factors affecting digital literacy training offered by local community organizations, such as public libraries. Theory based on the educational assessment and information literacy instruction literatures, community informatics, and situated learning theory served as a lens of investigation. Case studies of two public libraries and five other local community organizations were carried out. Data collection comprised: one-on-one interviews with administrators, instructors, and community members who received training; analysis of training documents; observations of training sessions; and a survey administered to clients who participated in these training sessions. Data analysis yielded the generation of a holistic conceptual framework. The framework identifies salient factors of the learning environment and program components that affect learning outcomes arising from digital literacy training led by local community organizations. Theoretical propositions are made. Member checks confirmed the validity of the study's findings. Results are compared to prior theory. Recommendations for practice highlight the need to organize and train staff, acquire sustainable funding, reach marginalized populations, offer convenient training times to end-users, better market the training, share and adopt best practices, and better collect and analyze program performance measurement data. Implications for future research also are identified.

Introduction

Digital literacy is defined as "the set of skills, knowledge and attitudes required to access, create, use, and evaluate digital information effectively, efficiently, and ethically" (Julien, 2018, p. 2243). It is the ability of people to locate, organize, understand, evaluate, and create information using digital technology (Bawden, 2001; Gilster, 1997), as well as "[t]he ability to use technological tools to solve problems, underpinned by the ability to critically understand digital content and tools" (Brookfield Institute, 2018, p. 4). Those who possess such skills are considered digitally literate. There are substantial benefits in being digitally literate because possessing such skills and abilities leads to more positive health outcomes (as people are more able to obtain high quality health information online), better access to government services, greater participative governance, improvements in workforce development (improved job performance, employment), and the bridging of the digital divide (Julien, 2018).

To improve digital literacy skills among community members, digital literacy training is needed. However, barriers to digital literacy training exist. These include: a lack of access to the Internet, data, hardware, and software; inability to pursue education and training opportunities due to financial and geographic barriers, travel time to programs, the need for childcare, etc.; potential students not seeing themselves reflected in the digital literacy training programs provided; intimidation and fear of failure among beginners and more advanced learners; and insufficient intermediate-level digital literacy training opportunities (Brookfield Institute, 2018). Approaches to adult learning often neglect the digital education needs of marginalized groups (Elfert, 2019). For people who live in urban centers with disposable income and high literacy levels, it is relatively easy to access and pay for training, whether to upgrade skills in their professions or to transition into the technology sector. Outside of major cities and for those without disposable income, access to digital literacy training and education can be much more difficult (Brookfield Institute, 2018). The COVID-19 pandemic exacerbates barriers to digital literacy training provided by community-based educators among low-income populations (Smythe et al., 2021).

Importantly, public libraries, as well as other local community organizations, play a key role in the promotion of digital literacy skills to community members. In this paper, a local community organization is considered an organization concerned with making desired improvements to a local community's social health, well-being, and overall functioning. Such organizations improve the welfare of those living in a local community; these community organizations are often not-for-profit organizations. They include public libraries and social service organizations. These organizations provide local community members with free (low-cost) training opportunities and strive to serve those who may not have access to such training (Manžuch & Macevičiūtė, 2020).

Public libraries have embraced an evolving role as digital literacy and inclusion centers and have become important community hubs (Nordicity, 2018). Understanding and sharing local evaluation and research findings on digital literacy initiatives led by public libraries is an excellent way to leverage best evidence-based practice in this area (Ryan & Cole, 2016). Contributions to the economic health of communities and the economic success of individuals are major reasons why public libraries should teach digital skills (Horrigan, 2015; Public Library Association, 2021). According to Horrigan (2015), the Pew Research Centre identifies that the public wants libraries to teach digital literacy and that library efforts can help the most vulnerable groups in this regard.

In general, local community organizations offer programs to teach people, including children and senior citizens, how to use digital tools such as computers, smartphones and apps, and how to protect their privacy and security online. There is a strong connection between a local community organization's support of digital literacy skills and employment. Local community organizations can provide community members with free or low-cost training opportunities (e.g., coding clubs; Internet safety; use of online government services; access to public health information; makerspaces), especially to those who may not have access to such training opportunities (e.g., seniors; youth facing employment barriers; newcomers; marginalized communities).

Given this context, it is important to investigate the factors affecting the success of digital literacy training initiatives run by local community organizations, as people need to be digitally literate in order to fully participate and thrive in today's society. It is crucial to understand how best to offer such training. This is especially true of local community organizations that wish to deliver digital literacy training to community members who may have no others means by which to receive such instruction.

The overarching research question guiding this study is as follows: "What factors affect the success of digital literacy training led by local community organizations?" An answer to this question will yield not only theoretical insights, but also offer recommendations for practice about how to run successful digital literacy training events for local communities.

In response, this paper presents findings of an exploratory research investigation conducted at two public libraries and five other local community organizations in two major cities in Ontario, Canada. Theory based on the educational assessment and information literacy instruction literatures, community informatics, and situated learning theory sets the boundaries of investigation. One-on-one interviews, analysis of training documents, observations of training sessions, and a survey administered to clients who participated in these training sessions constitute the study's data collection methods. Analysis of the data yields the generation of a conceptual framework showing learning environmental factors and digital literacy program components that affect psychological, behavioral, and benefit learning outcomes. Recommendations on the delivery of digital literacy instruction given by local community organizations are also provided.

Literature Review

Information literacy and educational assessment theories (Boyer & Ewell, 1988; Lindauer, 2004; Sims, 1992) strongly inform the boundaries of investigation. According to these theories, any assessment of information literacy instruction should involve “three arenas.” The first is the learning environment in which instruction occurs. This includes components of the learning context surrounding the delivery of instruction such as the broader program curriculum, co-curricular learning opportunities, and independent learning opportunities. The second are program components. These are specific features of the instruction itself, such as courses, workshops, instructional learning sessions by appointment, and independent learning opportunities. The third are learning outcomes. These are the effects of instruction on recipients. Psychological outcomes are changes in attitudes or values. Behavioral outcomes are changes in action. Benefit outcomes are effectiveness and efficiency gains, such as higher grades, improved program completion rates, and better workforce preparation. According to these theories, there is an implied causal relationship between the learning environment/program components and learning outcomes.

Detlor et al. (2011) and Serenko et al. (2012) – as described in their published papers in the *Journal of the Association for Information Science and Technology* – utilized the theoretical contributions of educational assessment and information literacy instruction theory in their investigations of information literacy instruction given by librarians that affect the learning outcomes of university business students. Importantly, their investigations yield theoretical models of the factors affecting the delivery of information literacy instruction given by librarians to students. These authors’ findings provide empirical evidence of cause-and-effect relationships between instructional training factors (i.e., the learning environment, program components) and learning outcomes (i.e., psychological, behavioral, and benefit outcomes). Saunders (2018) further verifies the importance of information literacy instruction provided by libraries.

In terms of the learning environment, Detlor et al. (2011) and Serenko et al. (2012) found that budgets, resources, and evaluation (performance measurement) of the provided training affect learning outcomes. For example, restricted budgets limit what type of training can be offered and how that training can be delivered. A lack of skilled instructors or up-to-date teaching labs hinders constructive teaching. Instructional programs that are regularly and rigorously evaluated

lead to the delivery of higher quality training. The learning environment pertains not only to individual institutions, but also to the larger community which provides collective training. The learning environment also encapsulates the provision of infrastructure needed to promote successful community-led digital literacy training. Star (1999) describes infrastructure as having the properties of embeddedness, transparency, reach or scope, and the embodiment of standards. Star (1999) also states that infrastructure is learned as a part of membership, linked with connections of practice, built on an installed base, visible upon breakdown, and fixed in modular implements. Such elements need to be considered when deciding upon the elements that should comprise a digital literacy infrastructure.

With respect to program components, these authors conclude that the type of skills taught, the timing of the instruction, the amount of active (i.e., non-passive) instruction, the availability of instruction materials, the amount of material delivered, and the length of a training session impact learning outcomes. For instance, skills taught that are most needed to improve the quality of a student's daily life and/or employment opportunities are most appreciated, yielding positive learning outcomes. If convenient teaching times are offered, then this leads to more uptake of the training and more opportunities for the instruction to yield positive learning outcomes. When more engaging, interactive training sessions occur and when course materials are provided in advance of the training, this leads to a better student experience and positive learning outcomes. When the amount of learning time matches the time required for students to comprehend and master the material being taught, this also leads to positive learning outcomes.

Collectively, the learning environment and program components compose a situated context that impacts the delivery of community-led digital literacy training. For example, the opportunities for community-led digital literacy training are subject to the vagaries of staffing and budgets and may impact the absence or presence of community-led digital literacy training opportunities.

Detlor et al. (2011) and Serenko et al. (2012) identified various psychological, behavioral, and benefit outcomes as a result of the training provided. In terms of psychological outcomes, positive learning experiences lead to decreased online library anxiety, increased online library self-efficacy, improved perceptions of the instructors (librarians) delivering the training in terms of perceived value and their helpfulness, as well as improved perceptions of the organization (library) delivering the training and the value of that organization. With respect to behavioral

outcomes, positive learning experiences yield improved and increased use of online library resources, instructors (librarians), and the organization (library) providing the training. When analyzing benefit outcomes, positive learning experiences lead to time savings, effort reduction, improved grades and coursework, an increase in workforce preparation, and cognitive gains in knowledge. These authors also identified certain learner demographic factors as impacting learning outcomes. Specifically, they found that past relationships between students and the organization delivering the training, the relevance of the instruction to a person's career goals, self-perceptions of an individual's information literacy skills, and gender affect learning outcomes. For example, negative perceptions of the organization offering the training and/or bad past experiences working with that organization limit learning outcomes. Learners who perceive the instruction as being useful for future career gains and who perceive themselves as being more information competent are more likely to experience positive learning outcomes of the training provided. Females, as compared to males, were found to value the benefit of saving time more than other benefits of the training received.

Similar findings were reported by Woo et al. (2019) in their exploratory investigation of the relationship between the use of a Learning Commons (an informal learning space) and university students' learning behaviors and skilled development. That study identified specific psychological, behavioral, and benefit learning benefit outcomes. These include: decreased virtual learning anxiety, increased virtual learning self-efficacy, improved perceptions of the virtual learning environment, improved perceptions of the value of other informal learning spaces, improved perceptions of instructor helpfulness, increased use of the virtual learning environment, increased use of other informal learning spaces, time-savings, effort reduction, collaborative problem solving skills improvement, and improved learning outcomes.

Other investigations of digital literacy training provided by public libraries report similar results. In particular, they conclude that public libraries are finding it difficult to offer community digital skills training due to a lack of available public funding and marketing, but they are turning to graduate school training programs where students can successfully provide needed digital training instruction to community members (Johnson & Lasher, 2021; Roy et al., 2010). A range of technology help is also offered by public libraries from formal workshops to individual tutoring and drop-in hours (Johnson & Lasher, 2021).

In addition to insights from the educational assessment and information literacy instruction

literatures, discoveries from the community informatics literature support the need for community-level research in this area. According to Veinot & Williams (2011, p. 860), "[c]ommunity-level information studies research has the potential to transform contemporary information practice," especially at public library and community network levels as these are mandated to serve specific geographic areas and provide many useful services to community members. For example, Gardner et al. (2012) and Russell & Young (2015) advocate the benefits of the ability to use digital devices in later life among members of the senior community; while Williams (2012, p. 47) describes how digital literacy training given by a library can be considered an informatics moment (i.e., "[e]mpirically, it is a moment when a library patron is seeking and getting help using a computer or the Internet"). Lenstra (2017) provides empirical evidence showing that older adults are not passive participants in technology learning, using services provided to them by others, but rather actually shape how learning services are offered by public libraries and senior centers, and the institutional contexts in which these services exist. This contextual reciprocal relationship between technology and people may be true of other demographics as well. In fact, the shaping influence between people and technology in situated contexts lies at the heart of the philosophy underlying the community informatics literature (see, for example, Gurstein (2012) and Loeb (2012)).

In support of these insights from the community informatics literature, situated learning theory suggests that learning is situated in context (Lave, 2009) and that there is a need to provide best practice in situated-learning environments (Brown, 2006; Brown et al. 1989; Lave, 2009). Such examples support the need to contextualize the delivery of digital literacy instruction to community members delivered by local community organizations. This approach suggests specific guidelines when designing instruction: i) students should be presented with realistic and relevant problems to solve; ii) instructors should serve as coaches or facilitators rather than as lecturers; iii) the learning environment should promote reflection, discussion and evaluative thinking where students are actively engaged; and iv) the content of a course should not comprise neat packages of information taught by an instructor, but rather involve contextual and real-life learning activities (Kurt, 2021). In this sense, learning occurs best when it takes place in the context in which it is applied. Students serve in an apprentice capacity within communities of practice where learning opportunities arise situationally. As students gain experience and competence, they gradually move from an apprenticeship role to full participants in their community of practice (Besar, 2018; Drew, 2019; McLellan, 1995, Suchman, 1988).

Based on the above theoretical background, key theoretical factors such as the learning environment, program components, and learning outcomes (namely, psychological, behavioral, and benefit outcomes), and their interplay in situated learning contexts constitute the boundaries of investigation for this study. These key theoretical constructs were pivotal in devising questions to ask participants in the current study. For example, survey and interview questions asked of participants dealt with their perceptions of the learning environment and program components of their training sessions, as well as the learning outcomes of the digital literacy instruction received and how their situated learning contexts impacted the training received. Further, initial analysis of the collected data was guided by these key constructs. In these ways, prior theory set the boundaries of investigation and provided the researchers with a theoretical lens from which from which to glean insights and make discoveries.

Methods

The Research Ethics Boards responsible for the jurisdictional review of this study conducted by members of the research team approved the study design. To answer the study's research question, the investigators approached a variety of local community organizations. In the end, two local public libraries and five other local community organizations that deliver digital literacy training agreed to participate in the study. Non-library community organizations involved two types of organizations: i) not-for-profit organizations (e.g., a local industry education council, a Boys and Girls Club, and a Mathstronauts training program); and ii) community research organizations (i.e., independent research institutes affiliated with local universities) interested in launching their own digital literacy programs and assessing the efficacy of these programs.

Public libraries in this study offered a wide spectrum of both basic and advanced digital skills training to the public. Basic skills training focused on how to use social media, surf the Internet, and use MS Word. Advanced skills training consisted of courses such as HTML/XML coding and website design. Community not-for-profit organizations recruited for this study tended to target young people, specifically K-12. Emphasis was placed on providing computer programming training and running special events such as a hackathon, where participants could earn certificates/scholarships. Community research organizations in this study tended to focus on more advanced training (e.g., Artificial Intelligence) and to target multiple age groups and demographic segments, especially under-represented populations.

Data were collected in a variety of ways. The first was through one-on-one interviews held with 14 administrators, six training instructors, and 23 end-users (local community members) who attended training programs. End-users and instructors were given a $10 gift card for their participation as an incentive to participate in the study. No compensation was given to administrators.

Eleven of the administrators were women and three were men. Titles of these individuals typically consisted of “Director”, “Manager”, “Chief Librarian”, “Program Manager” and “Policy Analyst”. With respect to training instructors, two were women and four were men. The 23 end-users who participated in the study formed a diverse sample, although most comprised two specific sub-samples: i) youth between 7 to 12 years of age, and ii) older adults between 54 and 82 years of age. Of these 23 end-users, eight were women and 15 were men.

All interviews, except one end-user interview, were digitally recorded and later transcribed. For that one interview that was not digitally recorded, hand-written notes were taken in lieu. Interviews with administrators and instructors averaged between 45 and 60 minutes in length. Interviews with end-users who took part in a training session lasted ten minutes on average.

Prior to the interviews with end-users, participant observations of the training sessions these end-users attended were conducted. Two members of the research team were present at each session, and each took independent notes during the training session. The notes recorded impressions of the physical environment, the content being taught, how it was delivered, reactions from the people taking the training, the mood of the room, etc.

Immediately after a training session occurred and prior to the interview sessions with end-users, a paper questionnaire was administered individually to each end-user who agreed to participate in the study. This questionnaire collected basic demographic information (e.g., age, gender, education), as well as end-user self-perceptions of comfort, confidence, and efficacy using new information technologies.

With respect to administrators and instructors, interview questions were based on theory derived from the educational assessment and information literacy instruction literatures, community informatics, and situated learning theory described above. Questions asked included the following:

- Describe the various digital literacy training initiatives provided by your organization.
- What factors inhibit or promote the successful roll-out of these training sessions?
- What is your role and experience with designing or implementing the digital literacy training your organization provides?
- What activities were you involved with in the digital literacy training your organization provides?
- Regarding the activities you were involved with in this training, what worked well? What didn't work so well?
- What advice would you give others working on similar digital training initiatives?
- How has the delivery of this training impacted your organization? Your daily role?
- What do you envision the future impact of digital literacy training will be on your organization?

Last, documents were collected from administrators and instructors that pertained to the training initiatives being investigated (e.g., project charters, training materials, recruitment messages).

Dedoose, a qualitative data analysis software tool, was used to store all data collected in the study (i.e., interview transcripts, researcher observation notes, training documentation). Dedoose was useful to examine individual cases (from both organizational and end-user perspectives) and delve deep into differences among users (in terms of age, gender, etc.) and into differences among different organizational types (i.e., libraries, community not-for-profit, and community research organizations).

Qualitative data analysis methods advocated by Charmaz (2014) were used to explore and identify categories and themes in the data. This approach was inductive and exploratory in nature, rather than to test or validate pre-conceived notions. This approach assumed that the opinions and reflections of both researchers and participants help constitute a shared understanding and interpretation of the phenomenon under investigation.

Two rounds of in-depth coding were conducted. The first round involved the creation of a codebook for administrators and a separate codebook for instructors and end-users based on constructs from the study's theoretical background. Researchers also freely created new codes "in vivo" (i.e., on the fly). The second round of data analysis went further into exploring the factors identified from the first round. This involved examining how identified factors inter-relate,

and how these factors differed between groups. This involved looking at differences across types of organization delivering the training (e.g., libraries vs. other community organizations), types of training (e.g., advanced vs. basic), governance approaches (e.g., centralized vs. distributed), and target audiences (youth vs. seniors). This also involved looking at how the characteristics of a digital literacy training session affect end-user perceptions of the training, as well as end-user confidence and interest in using new information technology in the future, as a result of participating in a training session. Differences between youth and older adults, and between men and women, were also analyzed.

As a form of member check, a working paper summarizing the study's findings was produced and sent to all administrators and instructors who participated in the study, as well as to the Board of Directors of two partner organizations involved in the funding of this research. In addition, a presentation of the study's findings was given to the Board of Directors of one of these partner organizations. The feedback received was positive; no major revisions or changes were recommended. Remarks received indicated that the study's findings adequately captured the benefits and challenges of delivering successful community-led digital literacy training programs.

Findings

The above data collection and analysis elicited numerous findings and insights (see: Barrie et al., 2021; Julien et al., 2021; Julien et al., 2022). To provide structure in the communication of these findings, they are organized in terms of the key theoretical components identified above in the literature review: the learning environment, program components, and learning outcomes.

The Learning Environment

A lack of ***funding*** was a common theme elicited by administrators during their interviews about the future sustainability of digital skills training programs. One community not-for-profit administrator succinctly pointed out that "*the life of the program is the life of the grant*," implying that external grant funding, while appreciated, makes a digital skills training program largely dependent on external funding. Funding from both public and private sectors is critical in providing local community training. Among public library administrators, the threat of municipal or city governments cutting off dollars or reducing budgets was mentioned as a significant threat to delivering digital skills training to the public.

In terms of ***classroom resources***, instructors interviewed for this study commented frequently how there is a constant need to increase or repurpose spaces for new hardware (e.g., makerspaces and virtual reality technology). Adequate and dedicated teaching space is necessary.

The provision of qualified and sustainable ***teaching staff*** was another common theme elicited among participants. For public libraries, often the problem is training. Staff are generally willing to participate, but there is little time to train staff because other duties take precedence. Further, some library staff have little interest in digital skills training. As one library administrator/instructor noted, "*The role of the librarian is changing to become more digital-savvy. Some staff members [longer-term staff] are in denial and are resistant to this change.*" One instructor spoke about the disconnect between the goals of higher levels of governance and the actual abilities of library staff. The primary challenge, according to some instructors, is the changing role of the librarian and the need for staff to be adequately trained to teach digital skills. This challenge was expressed in terms of the difficulty of a changing role overall, as well as the difficulty of varying staff skills and comfort level with technology, and staff knowledge of teaching/pedagogy. The following interview excerpts highlight these points:

- *"None of us are programmers."*
- *"We also have to recognize that library staff members cannot be expected necessarily to be teachers."*
- *"There's always pushback from staff who say, well I don't know that particular skill, or how can I be expected to learn all these things."*

Scheduling was also mentioned as a challenge for instructors in public library settings. The traditional "nine-to-five" workday is difficult for providing digital skills training courses that are accessible to a wider range of communities. To alleviate these training and scheduling issues, public libraries are partnering with external organizations, particularly technological savvy ones such as Google and Cisco Networks, to provide training programs that community members need and want.

Training issues were also identified by community research organizations. Specifically, they are challenged by a need to employ staff who are highly digitally literate and trained from the start.

Community research organizations seem to require a high degree of organization and governance to develop curriculum and implement it through instructors. They also require a good deal of collaboration between instructors to keep this curriculum consistent. Community research organizations also reported issues with organizing and training staff. One of their significant challenges is attracting and maintaining instructors, who may be working through graduate school and are able to commit to instruction on short timelines. These instructors need to be trained and ready before the courses begin. To mitigate this challenge, community research organizations have the benefit of partnering with stakeholders from academic communities to deliver digital skills training programs. Interestingly, public libraries, like community research organizations, are increasingly relying on university partnerships to gain insight on how to best deliver digital skills training and how to share best practices among library practitioners and university researchers interested in digital skills training.

Likewise, training is a concern for community not-for-profit organizations. This is particularly true with respect to keeping and paying instructors. There is a need to incentivize instructors to stay, as well as encourage them to form lasting relationships with students. According to interviewees, the biggest challenge for community not-for-profit organizations is keeping and paying instructors, who are mostly graduate students. These organizations need to incentivize their instructors in order to retain them and form long-standing relationships with students.

In terms of ***evaluation***, there is a great lack of activity in collecting and analyzing performance measurement data. Instructors reported how they often subjectively measure the success of a training session through their own perceptions of how the training went, but no clear or sufficient performance measurements are actually collected. As one instructor reported: *"A lot of it [feedback on the success of the training] is anecdotal in terms of people running the programs making an assessment based on who's there, this worked, this didn't work […] rather than a hard look at data."*

According to instructors, the following evaluation categories are important to track:
i) participants' understanding of the importance of information technology in their lives; ii) the degree to which the digital skills training serves under-represented groups or marginalized populations; iii) the number/retention of participants in the digital skills training provided; iv) positive life outcomes of participants as a result of the training; and v) pedagogical success factors, such as the degree to which the training allows participants to teach themselves, be on

the cutting edge of new technology, and the ability of instructors to plan and deliver their classes in ways they see best.

Though there are many ways that individual instructors subjectively measure the success of the courses, there is no real feedback system from participants and there is limited formal evaluation. One instructor spoke about this as a challenge to balance evaluation and privacy, referencing the library's ability to give clients the opportunity to come into the library and use resources anonymously: *"There is evaluation, but one of the main tenets of the library is privacy as well."*

Several instructors mentioned the need to capture not only end-user metrics but also instructor metrics on how well a particular digital skills training session went. Instructors commented on the need to capture both quantitative and qualitative metrics across the board, and the need to compare differences internally within a single library (branch by branch) or across libraries (within the province). Many instructors discussed the importance of anonymizing this data and then opening up this data to others for scrutiny and investigation.

Public libraries in this study were heavily concerned with participation and retention numbers. Analysis of the interview data from administrators and instructors indicated that public libraries worry about these numbers as these numbers reflect the degree to which public libraries are considered as first-point contact points for digital literacy instruction for the communities they serve, and the ability of public libraries to deliver such training on a continual basis.

In terms of ***knowledge sharing,*** instructors commented that there was a lack of sharing between instructors about how best to deliver a particular curriculum. More knowledge-exchange between instructors is needed, both within and across digital literacy training programs. Instructors interviewed in this study commented that although development of digital skills training instruction is planned, it is administered largely through trial and error in terms of figuring out what works, what content to teach, timing, etc. As one participant said: *"We're willing to kind of fail as we try things."*

This context is understandable due to the changing nature of technology and community needs, especially with respect to public libraries. Historically, digital skills training emerged in public libraries by offering access to public computers and responding to a need to provide support and literacy skills in this area. But today, the variety of technology a library provides to its

members has grown exponentially, causing the need to offer training on a much larger and more complex suite of information technology tools. Makerspaces tend to be an origin point for training in libraries, as libraries find themselves needing to provide training on any piece of technology or software a makerspace provides, e.g., an embroidery machine, as well as Photoshop or MS Word (Einarsson & Hertzum, 2021). This presents a challenge, as the training scope is broad. Keeping up with such community training demands is difficult, leaving even less time and capacity for instructors to reflect upon what elements of the training went well, what did not, sharing these insights with others, and learning from other libraries about their own instructional experiences.

The public libraries involved in this study make good efforts to address this concern. For example, one of them implemented a digital literacy skills committee, which has working groups within it. These working groups maintain, update, and develop literacy skills courses once a need is identified by clients/staff.

Despite these good initiatives, more efforts are needed for public libraries to share their experiences on how best to deliver digital skills training. Currently, public library practitioners engage in knowledge sharing mostly through word-of-mouth and other informal ad-hoc sharing opportunities, as evidenced by the following interview extracts:

- *"Outside of [my library], the following are used to share best practices: list-servs for various library-related professional associations, personal networks with other librarians in different libraries. Librarians are great at sharing information and ideas with others. It's a collegial profession… librarians share."*
- *"Lessons learned about how best to deliver digital literacy training is ad hoc and not well communicated nor well-documented. Often shared by word of mouth."*

Although professional library associations try to share insights and best practices through digital channels and publications, the up-take and sharing of such information on these channels has been historically low and slow to disseminate. Academic researchers with interests in digital skills training tend to publish their findings in academic outlets, and library practitioners often do not have access to these publications and need more immediate, practical recommendations.

Currently, several difficulties exist in the sharing and uptake of best practice information and leading research in the delivery of digital skills training by public libraries. This includes a lack of time by library practitioners to seek out and read this information, a lack of opportunity for one-stop shopping of such information, and the difficulty in sharing insights and lessons learned by both library practitioners and academic researchers in online and off-line formats, especially on-demand. A better way is needed to share insights and best practices in the delivery of digital skills training among library practitioners and academic researchers. Challenges include: a lack of human resources to share digital skills training knowledge, and a digital collaboration space that secures sufficient uptake.

Program Components

Participants stressed the importance of the ***timing*** of the instruction offered. It is difficult for all three types of organizations identified in this study to provide training at time that is most conducive to local community members. The scheduling of such training depends on instructor availability and attendee availability. For example, week-day library training (when library instructors are generally available) tends to cater to older retired adults. For community not-for-profit organizations, afterschool programs may work for younger students, but older youth may have other responsibilities preventing them from attending such training. Further, the time of year affects the scheduling of course delivery: in summertime, community members have other obligations; while in winter, people tend not to go out. Careful consideration is needed to figure out the best time of year to offer local community training to maximize attendance.

Marketing of the training impacts who attends training opportunities. With respect to public libraries, many local community members are unaware of training that is offered as current marketing efforts are limited and reach narrow target segments. One library instructor spoke about the need to expand advertising efforts: *"We never really promote ourselves very well. So, a lot of customers will come up and really be blown away with the technology that we have. And then they'll tell us, we didn't even know that this place existed."*

In public libraries, training is largely marketed in two main ways: i) the library website's online events system; and ii) the library's "What's Happening" guide. Other techniques, such as social media, are utilized to a small degree, but generally not used in any substantial way for training promotion. Outreach at specific locations, posters, and local media (like the local newspaper)

are used to lesser degrees. Of the 23 end-users interviewed in this study, the two most common methods of discovering the library training that they took were through a family member and the library program guide, followed by the library website. In-person at the library, telephoning the library, and seeing an ad in the local newspaper were additional methods, but these were only mentioned by one or two participants. Older adults largely found out about training because of the library program guide, adults through the library website, and youth through a family member.

Community research organizations reported that they market their programs through handouts, posters, branch websites, program guides, employment websites, Youth Hubs, and 'Pop up events' set up through Coursera. It seems that programs offered by community research organizations are better able to develop their curriculums well ahead of time rather than just before actual training begins. This has two benefits: i) curriculums can be 'shopped out' to potential funders; and ii) they can be made into 'mini modules' for instructors to implement into their own courses.

Community not-for-profit organizations involved in this study utilized a novel way of reaching out to the community about their digital skills training programs by providing live demonstrations about this training to their targeted audience during times when they can speak to them: "*We demo our projects, we let students try it out, we do some live coding. So, okay sure, they can't stay after school and they can't have these other commitments or that they're not interested in having that kind of thing going on. But can we go in during school time where they're already settled in a classroom and all we're doing is kind of delivering that message and getting them engaged a little bit."* Community not-for-profit organizations also utilized other approaches to advertise to their target base: "*We use social media a lot for promoting youth programs. We work with community partners like schools, city housing for the seniors too. So, partnering with different people in the community that have access to these populations other than us. So, schools are great [to reach out to] kids and youth."*

Different types of organizations offered different ***types of training***. Public libraries delivered a wide spectrum of both basic and advanced digital skills training to the public. Basic skills training consisted of things like how to use social media, surf the Internet, and use MS Word. Advanced skills training included HTML/XML coding and website design courses. Community not-for-profit organizations tended to target young people, specifically K-12. Emphasis was placed on

providing computer programming training and running special events such as a hackathon, where participants could earn certificates and scholarships. Community research organizations tended to focus on more advanced training (e.g., Artificial Intelligence) and to target multiple age groups and demographic segments, especially under-represented populations. Local community members who attended advanced training were more likely to report expanding their knowledge/skill with technology than those learners who attended basic training.

An analysis of the interview data from the 16 adult and older-adult end-user participants identified several ***training characteristics*** that yielded positive impressions of the instruction provided: active learning (e.g., learning by doing; experiential learning); delivering a finished product; learning (useful) skills; low-cost (free); a step-by-step learning process; handouts; starting with the basics; focusing on one skill at a time; creative aspects; one-on-one instructor help; good learning pace; and small class size.

Learning Outcomes

A variety of psychological, behavioral, and benefit outcomes were identified. These are summarized below.

In terms of psychological outcomes, ***increased digital skills confidence*** and ***increased digital skills competence*** were expressed by those who attended the training sessions. For example, of the 23 end-users who were interviewed in this study, almost all expressed increased digital skills confidence post-training. The survey administered to these 23 end-users suggests that the more digital skills competence an end-user self-perceives, the less perceived difficulty a person will experience using information technology in the future. Men reported higher perceived digital skills competence than women ($p<0.05$, Mann-Whitney U Test). With respect to age, Spearman's rank order correlations yielded the following results between age and digital skills competence (-0.37, $p<0.1$) and between age and difficulty (0.62, $p<0.005$). This can be interpreted as follows: the older people are, the less competence and more difficulty they have dealing with information technology. Further, local community members consistently reported an ***improved understanding of the importance of information technology*** in their daily lives.

With respect to behavioral outcomes, two findings were particularly salient as identified by participants. The first was learners' ***ability to apply the skills learned*** from the training received, such as the application of the skills learned to new jobs/education, hobbies, etc. The

second was an increased likelihood of learners to have an ***increased intention to pursue further digital literacy training***, leading to healthier statistics in the number of people who take digital skills training courses and becoming recurring participants in future training sessions offered by local community organizations.

Regarding benefit outcomes, participants who attended basic training sessions were consistently more likely to report ***improved information behavior***, such as creating new information, evaluating new information, finding new information, reduction of effort, and achieving time-savings.

Fourteen out of the 16 adult and older adult learners stated during their interviews that the skills learned in their digital literacy training would lead to ***improved wellbeing***. Nine of those 16 stated that the training would improve their access to services such as finding a doctor, nutritionist, or authoritative health-related information. Examining the data for differences along gender (men vs. women) and level of difficulty of the instruction (i.e., basic vs. advanced) yielded no significant findings. Instead, for this category, there was general consensus that the training offers improvement to one's wellbeing.

Closer examination of the data identified that those participants who needed to learn basic digital skills found that learning these skills during the training sessions improved their access to services, while participants who already had these basic skills before the training felt that the training had little effect on providing improved access to such services. Gender differences along this dimension were found: 70% of participants who anticipated improved access to services from the skills learned were women, while 30% were men. Adults and older adults were equal in their response to this question; however, there was a significant difference when examining this category by level of training as those who attended a basic training session indicated that the training received would improve their access to services in the future, but those who attended an advanced training session did not believe so. It seems plausible that participants who needed to learn basic digital skills would find that learning these skills improved their access to services, while participants who already had these basic skills, and were looking to use these skills for a creative purpose or end goal, would perceive themselves as already having the digital literacy necessary to access services and that the training did not provide much value here.

Eight of the 23 end-users (all men) stated that the skills learned would benefit them in terms of ***gains in career/employment/education***. Note that in reporting this finding, only three participants specifically came to this training for work-related goals; two were adults and one was an older adult. Out of the other five participants, four were youth who stated that the skills would help them in school or a possible future job, and one was a soon-to-be retired older adult who stated that the skills would help if he found a job at a hardware store to stay busy in retirement. Though most of the 23 end-user participants did not attend the training sessions for career development or education, a significant portion found that the skills provided by the training would be useful for careers/school regardless.

Discussion

Overall, the findings present a complex picture of digital skills training provided by local community organizations. Local community organizations (e.g., public libraries and social service organizations) recognize and acknowledge the importance of delivering digital skills training to local community members, especially those from marginalized populations. Local community members, especially older adults, report that improved access to services and improved participation in society occurred as a result of the training received. Almost all participants felt that the training received would improve their personal life in some way, and a significant percentage felt the skills they learned would likely benefit them in terms of career, education, and employment.

Public libraries were found to be leaders in community digital literacy skills training. They provide a critical access point to the public. However, library administrators worry that public libraries are not considered key contact points for knowledge about digital technology among local community members (i.e., a user might rather contact a computer store or helpline). Of note, findings highlight how public libraries are innovative in their approach to digital skills training when their own abilities to deliver needed are somewhat lacking. For example, the libraries involved in this study, recognizing their limitations and constraints on the delivery of in-demand current technology know-how, have partnered with large technology companies (like Google and Cisco Networks) to provide digital skills training and certification so that marginalized people can gain meaningful employment in all types of organizations and industries where digital workforce skills are needed.

Findings among community research organizations and community not-for-profit organizations were largely the same compared to public libraries. However, subtle and unique differences were apparent based upon the nature, structure and sustainability of the organizations involved, as described in the Findings section of this paper. This observation highlights the fact that learning outcomes of students are situated-in-context of the learning environment and program components, as the community informatics literature (Gurstein, 2012; Loeb, 2012) and situated learning theory (Brown, 2006; Brown et al. 1989; Lave, 2009) collectively describe.

Common barriers or challenges mitigate the delivery of digital skills training across all types of local community organizations. For example, there is a need for further staff training, more regular and rigorous evaluation of digital literacy training success, better marketing of digital skills training courses, and more varied scheduling of digital skills training classes (in part to allow for additional demographics to hear about, be interested in, and attend the training). Feedback from students needs to be incorporated into the delivery and marketing of future training sessions. Training sessions need to integrate real-life information problems for students to solve so that learning is grounded in situated contexts because learning occurs best when it takes place in the context in which it is applied (Drew, 2019; Besar, 2018; Kurt, 2021).

Overall, the findings presented above describe four categories of success in the delivery of digital skills training by local community organizations:

- Improvement of community members' general understanding of the role and importance of information technology in their daily lives.
- Increased digital skills development of community members, especially among under-represented groups (i.e., marginalized populations).
- Evidence of positive life outcomes (e.g., increased digital skills confidence; application of digital skills learned to new jobs/education/hobbies) from people who take the training.
- Healthy statistics in the number of people who take digital skills training courses and become recurring participants in future training sessions offered by the organization.

Figure 1 summarizes the study's findings into a conceptual framework of factors affecting the success of digital literacy training led by local community organizations. Importantly, the framework identifies several propositions.

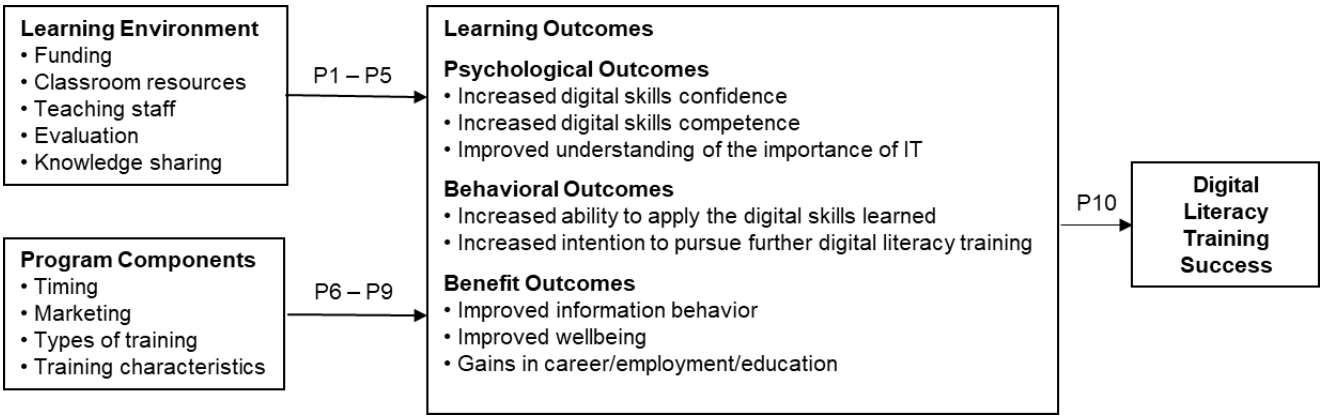

Figure 1: The study's generated conceptual framework

The Learning Environment

- [P1]: The greater the availability of sustained funding, the greater the learning outcomes of the digital literacy training provided.
- [P2]: The greater the adequacy of dedicated classroom resources, the greater the learning outcomes of the digital literacy training provided.
- [P3]: The greater the provision of proficient and sustainable teaching staff, the greater the learning outcomes of the digital literacy training provided.
- [P4]: The greater the amount of rigorous and regular program performance measurement, the greater the learning outcomes of the digital literacy training provided.
- [P5]: The greater the amount and frequency of knowledge sharing of best practices, the greater the learning outcomes of the digital literacy training provided.

Program Components

- [P6]: The greater the timing of instruction matches community needs, the greater the learning outcomes of the digital literacy training provided.
- [P7]: The greater the depth and breadth of marketing, the greater the learning outcomes of the digital literacy training provided.
- [P8]: The greater the alignment between the provision of digital literacy training the community wants and what the community receives, the greater the learning outcomes of the digital literacy training provided.

- [P9]: The greater the amount of training characteristics leading to positive impressions of the training, the greater the learning outcomes of the digital literacy training provided. These training characteristics include:
    - [P9a]: active learning
    - [P9b]: delivery of a finished product
    - [P9c]: learning (useful) skills
    - [P9d]: low-cost (free) training
    - [P9e]: inclusion of a step-by-step learning process
    - [P9f]: the availability of handouts
    - [P9g]: starting with the basics
    - [P9h]: focusing on one skill at a time
    - [P9i]: incorporating creative aspects
    - [P9j]: one-on-one instructor help
    - [P9k]: a good learning pace
    - [P9l]: small class sizes

Learning Outcomes

- [P10]: The greater the learning outcomes, the greater the success of the digital literacy training provided. These learning outcomes include:
    - [P10a]: increased digital skills confidence
    - [P10b]: increased digital skills competence
    - [P10c]: improved understanding of the importance of information technology
    - [P10d]: increased ability to apply the digital skills learned
    - [P10e]: increased intention to pursue further digital literacy training
    - [P10f]: improvement in information behavior
    - [P10g]: improvement in wellbeing
    - [P10h]: gains in career/employment/education

In terms of practical contributions, the conceptual framework elicits the following key recommendations to local community organizations:

- Organize and train staff. This involves providing better training opportunities for staff so they can be more up-to-date on the technical aspects of the training they provide, as well

as being better prepared to allocate time to devote to training during their working day. This includes placing more emphasis and resources on training the trainer in order to secure successful and robust digital literacy training to local community members.

- Acquire sustainable funding. This requires examination of new and sustainable funding models for the training provided.
- Reach marginalized populations. This includes better mechanisms to advertise training opportunities to marginalized populations, as well as better ways to secure their continued participation in such training.
- Offer training at convenient times to end-users. All local community organizations need to reflect on how to offer training at times that are most conducive to target audiences.
- Better market the training. Current marketing methods are lacking and basically secure attention to those who traditionally visit a public library.
- Share and adopt best practices. Better knowledge sharing is needed amongst those who deliver digital literacy training to local community members. Technological solutions are needed to enhance knowledge sharing, as well as opportunities for face-to-face in-person sharing.
- Better collect and analyze program performance measurement data. This area is greatly lacking. Minimal performance measurement data is currently being collected. There is room to collect more extensive and richer quantitative and qualitative metrics.

Importantly, results verify and extend work conducted by prior studies. For example, results crystalize earlier findings from the educational assessment and information literacy literatures in terms of fine-tuning aspects of the learning environment, program components and learning outcomes. Findings also resonate with earlier work published in the community informatics and situated learning theory literatures which stress the importance of the contextual reciprocal relationship between technology and people, and how the delivery of instruction to end-users (i.e., local community members) needs to be situated in context of community and the organizations which deliver such instruction (Brown, 2006; Brown et al. 1989; Gurstein, 2012; Lave, 2009; Loeb, 2012).

This study is constrained by certain limitations, specifically by the collection of data in two cities in Ontario, Canada. This limits the generalizability of the study's findings. However, these limitations are counter-balanced by the rigor of the study's data collection and analysis procedures: several different types of local community organizations were recruited; a wide variety of data collection methods were conducted; several rounds of data analysis were carried out; and results were validated through member checks. Having said this, given the close cultural and economic similarities of Ontario with other regional jurisdictions in Canada and the United States, similar results in those other jurisdictions are expected, but need to be verified. Other countries that offer more sustainable digital literacy training to community members, such as Scandinavian countries, may provide better and more stable funding to local community organizations for digital literacy training, and thus their experience and impact rolling out digital literacy training programs to local community members may differ. This, however, needs to be studied and verified.

Future research involves the refinement and validation of the study's conceptual framework and testing the propositions. Nation-wide surveys are planned across Canada to public libraries and their constituents to ascertain the factors affecting the successful rollout of digital literacy training led by local community organizations. Such an analysis will not only lead to assessment of the current state of digital literacy initiatives offered by public libraries but also offer further insights into the factors affecting successful digital literacy training success. This will lead to future theoretical and practical contributions.

Conclusion

This paper outlines results from an exploratory investigation of the factors affecting the success of digital literacy training initiatives run by local community organizations, including public libraries. The goal was to not only identify a preliminary set of factors, but also to leverage insight from these factors to produce a conceptual framework and recommendations for practice about how to run successful digital literacy training events for local community organizations. There is little, if any, scholarly work on the success of digital literacy initiatives run by local community organizations. Recommendations for practice are needed for local community organizations, such as public libraries, wishing to deliver successful digital literacy training to members of their communities. Preliminary conceptual frameworks are needed to advance research in this area. It is the hope of the authors of this study that the suggested conceptual

framework and propositions will serve as a basis for future investigations and expose valuable recommendations for practitioners to yield positive digital literacy training opportunities for local community members.

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