



A Collective Approach to Providing Digital Skills Training Among U.S. Public Housing Residents

Soyoung Lee
soyolee@umich.edu
University of Michigan
Ann Arbor, Michigan, USA

Zachary Rowe
zrowe@friendsofparkside.org
Friends of Parkside
Detroit, Michigan, USA

Julie Hui
juliehui@umich.edu
University of Michigan
Ann Arbor, Michigan, USA

Tawanna R. Dillahunt
tdillahu@umich.edu
University of Michigan
Ann Arbor, Michigan, USA

ABSTRACT

Addressing the digital divide would support access to essential activities such as healthcare, employment, and education among under-resourced communities in the United States (U.S.). However, half of the adults in the U.S. lack confidence and preparedness to use digital tools for learning. We developed and piloted an intervention to train public housing residents as intermediaries to provide digital support to their community members to address this gap. Collaborating with community partners, we developed a cohort-based basic digital skills training program consisting of online courses and offline social learning support. We trained nine public housing residents and present best practices of collective training and the challenges the trainees faced. Preliminary results suggest an increase in trainees' self-efficacy in basic digital skills. Our approach aims to increase digital literacy and minimize barriers to online learning among traditionally-excluded populations. Our work extends prior interventions that only provide device and Internet access.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**.

KEYWORDS

Community-based participatory research, Digital divide, Digital literacy, Online learning, Social learning, Social support

ACM Reference Format:

Soyoung Lee, Julie Hui, Zachary Rowe, and Tawanna R. Dillahunt. 2023. A Collective Approach to Providing Digital Skills Training Among U.S. Public Housing Residents. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (CHI EA '23)*, April 23–28, 2023, Hamburg, Germany. ACM, New York, NY, USA, 6 pages. <https://doi.org/10.1145/3544549.3585712>

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

CHI EA '23, April 23–28, 2023, Hamburg, Germany

© 2023 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-9422-2/23/04.

<https://doi.org/10.1145/3544549.3585712>

1 INTRODUCTION

The digital divide is a social inequality and challenge among under-resourced communities in the United States (U.S.) [35] that spans beyond access to devices and Internet connection. For instance, half of U.S. adults are not confident or unprepared to use digital tools for personal and job-related learning [14]. Digital skills training to access essential Internet-based resources like healthcare, employment, and education, is still necessary [34]. However, past efforts to bridge the digital divide have often provided individual technical resources (e.g., public Wifi, computers, computer labs) without providing the necessary training to use digital skills. Such efforts leave those with lower digital proficiency severely disadvantaged [5, 7, 27]. Drawing from past research finding human intermediaries as effective in disseminating knowledge and providing technology-related support to community members [3, 12, 21, 26, 31], we decided to train lay public housing community members to serve as intermediaries to bridge the digital divide by providing technical support to other community members. We use a community-based participatory research [17, 18] approach and present the initial results of our collaboration between a university research team and a Detroit non-profit. We investigated how our approach could mitigate the digital skills gap by asking the following research questions (RQ):

- RQ1: What should be considered when designing a model for basic digital skills training in a public housing community?
- RQ2: What are the best practices for implementing the training?
- RQ3: What are the challenges to implementing the training program?

Through the process of curating and coordinating digital skills training for a cohort of nine community members, we identify three best practices: 1) Foster social learning (e.g., provide support for cohort formation, open discussion on individual learning, check-ins through non-digital channels), 2) When using online learning resources, use those that provide live help, and 3) Provide hands-on practice opportunities. The initial training outcomes include trainees' increased self-efficacy in digital skills, ability to leverage greater digital resources (e.g., applying for benefits online), and gaining employment requiring basic digital skills. Our work contributes to (and shows the potential for) a collective digital skills development model using online learning resources among lay

community members. Our empirical results complement prior interventions that focus primarily on device distribution to bridge the digital divide [3, 5, 25]. Finally, we show that our training model can minimize online learning barriers through a cohort-based model, especially among traditionally excluded populations [6, 10, 20, 30].

2 RELATED WORK

2.1 A community-based approach to bridging the digital divide

Efforts to bridge the digital divide often provide individual technical resources (e.g., public Wifi, computers, computer labs) without providing the necessary training to use digital skills, leaving those with lower digital proficiency still severely disadvantaged, particularly in under-resourced communities [5, 7, 27]. To activate digital engagement, researchers have introduced community-based interventions that leveraged existing assets [32] in the community and encouraged the participation of community members. Past research found that, in addition to technical support, non-technical requirements such as social capital, social networks, and incubation from organizations are necessary for under-resourced communities [9]. For instance, Hui et al. found that a community collective of resource-connecting organizations can help local entrepreneurs engage digitally [16]. Similarly, using a community-based network in the cybersecurity sector, Nicholson et al. trained a group of senior citizens who later served as peer role models to disseminate cybersecurity information among seniors in the community. They found that these everyday peer intermediaries increased opportunities to gain and raise awareness of cybersecurity information. These works show the essential role of local intermediaries in distributing technology resources and support to community members. Our work aims to bridge the digital divide by enhancing digital literacy among everyday people [4, 7]. We leverage community-based participatory research and extend prior models to train local intermediaries to provide community-wide digital support.

2.2 Social learning based on technology in under-resourced communities

In the context of resource-constrained communities, particularly in the Global South, HCI scholars have implemented technology-based training projects that harness existing social networks for learning in the community, which highlights participatory processes involving human facilitators for the active engagement of participants [12, 37, 38]. While using existing or low-cost technology (e.g., videos, shared digital cameras and PCs [12] and mobile phones [38]), they focus on social dynamics and collaboration among peer learners and experts to share and co-create knowledge, and train community members, for example, in agriculture [12] and health-care [38]. Our work extends social learning as a strategy for bridging the digital divide by leveraging free and low-cost online resources for training to enhance basic digital literacy in an under-resourced U.S. community.

2.3 Online learning resources for basic digital skills

Online learning programs are often available for free or low cost. However, they have disproportionately benefited people in higher-resourced contexts. For example, Massive Open Online Courses (MOOCs), commonly offered by higher education providers [22], have shown limited results among those who earn less than advanced degrees and those who are low-wage and older learners [6, 10, 20, 30]. In addition, most studies of self-paced online learning programs are higher-education-level courses like online degree programs, and MOOCs [10]. Little work, however, has explored online learning resources around basic digital skills and how they are (not) accessed and leveraged to enhance digital literacy for those who stand to benefit from these resources [29]. Matzat and Sadowski found that self-learning-based digital skills development benefits those who already have strong digital skills. Furthermore, McDonnell et al. revealed that there seems to be a lack of instructional content and awareness of resources among practitioners to tailor digital literacy training to disadvantaged adult populations [24]. Carson et al. also found that those who were granted technology devices for the first time needed more “structured” help to learn digital skills through real-time instruction [5]. Self-learning resources were provided with the devices but were rarely used among low-income job seekers. These findings suggest that online learning resources themselves may be difficult to navigate or even be accessible for those who have little experience using computers and require basic digital skills. This highlights that a more effective connection between access to and actual usage of online learning resources is required to meaningfully benefit learners. We explore how communities can close this gap and leverage online learning resources for basic digital skills.

3 CONTEXT

Our collective training effort was conducted in partnership with a non-profit organization serving a predominantly African American public housing community in Detroit. According to the U.S. Department of Housing and Urban Development, public housing provides decent and safe rental housing for eligible low-income families, the elderly, and persons with disabilities [1]. Further, Detroit has a 30.2% poverty rate (\$20,780 per capita income and \$34,762 a median household income), and 83.8% citizens completed high school or had some college as their highest degree. One in five adult citizens is unemployed in this predominately African American city (77.9%). Low-income workers and people of color are disproportionately more unemployed [2]. While 25 to 30% of the citizens do not have internet access of any kind [25], citywide efforts have increasingly distributed computer devices to reduce the digital divide [11, 19, 25].

4 TRAINEES (PARTICIPANTS)

The collective training effort was conducted with a non-profit organization community partner. After the organization advertised the training opportunity within the community, a cohort of nine community members (7 female, 1 male, and 1 who preferred not to say) completed the 4-week training. Ages ranged between the late-30’s to late-60’s (average age 53), and trainees had a high school

diploma or some college education. While not intended in recruitment, many trainees from the community knew one another. They lived in nearby neighborhoods and thus saw one another regularly outside of training and, in some cases, volunteered together in the non-profit organization. Trainees had already known the Executive Director of the non-profit with whom they had a trusting relationship before the training. We believe this enabled the trainees to build rapport easily by harnessing their existing relationships, which became the foundation of collaborative learning.

The trainees' primary motivation for participation was to help others use digital technologies and learn computer skills. All trainees had at least one Internet-connected device (e.g., laptop, smartphone, tablet), and most had basic operational computer skills (e.g., turning on/off a computer, surfing the Internet, browsing social media posts). Trainees received a \$200 stipend for completing the minimum requirements of the program (90% of class huddles and team meetings, completion of all curated online courses, and pre-/post-assessment surveys).

5 STUDY DESIGN/METHOD

We followed a community-based participatory research approach [17, 18] and conducted a 4-week pilot program from May to June 2021. The goal was to train and pay trainees to provide basic digital support to other community members needing it. The Executive Director of the non-profit and the university research team began by discussing the need for training that could be completed in trainees' own time alongside synchronous peer engagement. We wanted to encourage training completion, especially during the COVID-19 pandemic.

We collaboratively curated a series of online digital skills courses (e.g., using Gmail, Zoom, Google Calendar, and Windows 10 on two online learning platforms). These courses provided basic computer skills commonly required in employment (e.g., work/volunteer in a non-profit) and tech help commonly requested by community members based on the Director's experience. We provided training through two online learning platforms in two formats: 1) GetSetup (<https://www.getsetup.io>), a live, peer-to-peer interaction learning platform for older adults, and 2) Bigger Brains (<https://getbiggerbrains.com>), an on-demand eLearning video platform¹. The trainees took courses individually at their own pace and discussed their experiences with other trainees.

We divided the cohort of trainees to three teams based on self-reported computer skill confidence and the Director's prior knowledge about them. We partially adjusted the team's composition at the beginning of the training to ensure that trainees who might need additional help to access online courses received it. We encouraged teams to meet regularly to support each other in completing the online courses and team assignments. The Director held twice-weekly virtual class huddles. Trainees gathered during these huddles to share their learning experiences, ask questions, and meet their team members. At the end of four weeks, trainees gave a final presentation about what they learned.

One researcher monitored and facilitated the training program with regular check-ins. All meetings were held virtually on Zoom

due to COVID-19 social distancing requirements. Data collection included (1) researcher observations of the virtual class huddles, (2) pre- and post-training assessment surveys, and (3) eight post-training interviews. Data analysis was conducted through inductive thematic analysis by the first author. To identify best practices and challenges (RQ2 and RQ3) of the training, the author iteratively read and coded interview transcripts, survey responses, observation records, and training materials and grouped the codes into common patterns of trainees' learning behaviors and experiences. The training outcomes were also quantitatively measured and analyzed by comparing trainees' survey responses before and after the training. This research project was reviewed by the university's Institutional Review Board and determined "not regulated."

6 FINDINGS

We first present the initial training outcomes. Then we discuss three best practices for implementing basic digital skills training in the Detroit public housing community: 1) Foster social learning based on a cohort, 2) When using online learning resources, use those that provide live help, and 3) Provide hands-on practice opportunities.

6.1 Initial training outcomes

Our early results and concrete outcomes after the training included gaining employment and utilizing digital skills they learned for everyday tasks, such as starting to use emails instead of making calls. For instance, a veteran trainee who could no longer easily apply for benefits in person could now apply online after receiving training. Our survey results also show overall participants increased self-efficacy (from 3.04 to 3.40, 1 = Not Confident to 4 = High confidence) in learning digital skills. Finally, we found that some trainees continued to take additional online courses to review and further explore other topics *after the training*. However, we also noticed that two trainees decreased their self-efficacy after the training. When asked during the interview, one trainee explained that as she learned more in the training, she realized that she did not know as much about technology (*"I was expecting to be like 100% of the computers... I felt under pressure a lot... I had to have everything jammed in me, by the end of the training and I realized that I didn't."*) But she added that she was still taking classes on the same platforms now she learned how to access after the training. In the post-training survey, five trainees reported experiencing technical issues (e.g., tablet malfunctions, internet disconnection). We discuss these challenges trainees encountered during the training in the Discussion.

6.2 Foster social learning

In our cohort-based training, three components of social learning—peer support, open discussion on individual learning, and check-ins through non-digital communication channels—across online and offline settings helped motivate trainees to take self-paced online courses and complete the training. This *"strong support system,"* was also crucial for trainees to build confidence in asking for help and learning new digital skills.

6.2.1 Peer support. While trainees took online courses and attended two weekly class huddles virtually, they predominantly

¹While our GetSetup-related classes were free, the university research team purchased a membership license for the trainees.

connected with their team members through phone calls, text messaging, and in-person visits. More than half of the trainees reported connecting with their team 3 - 4 times a week. Teams discussed what they liked and disliked about the courses and new computer jargon. Together, they worked through their anxiety over making mistakes when navigating new applications such as Google Slides or Gmail. All trainees reported that peer support was instrumental in overcoming challenges over the course of the training. Specifically, teams provided emotional and learning support to trainees who faced unexpected personal life challenges and had difficulty accessing online learning platforms.

Emotional support from peers was crucial for trainees who were more likely to experience unexpected personal life disruptions, significantly limiting their time and attention to the training. For example, two trainees had to move housing (un)expectedly in the middle of the training. Particularly one trainee received notice to move out of his housing within 24 hours. The move limited their training time and restricted physical access to the internet, hence their devices, given the temporal access gap. To maintain digital access during this time, one trainee used the computer lab located in the non-profit building, while the other trainee used her mobile phone to take online classes. This, however, was not as suitable to learn computer skills. The same trainee had to care for her ill sister and left in the middle of the final presentation after receiving a call from the emergency room. She described, *“I couldn’t put in the effort that I wanted to on everything because I was going through so much... It took me almost two weeks to move, and during the move, my sister got sick.”* During the interview, she thanked her team member, who always kept her in the loop of the training by calling and showing concern for her. Without team support, she said that she would have dropped out of the program.

Team-based learning also provided learning support for those who had difficulty accessing the learning platforms. In two teams, we observed that more digitally-knowledgeable trainees took it upon themselves to lead the team. They helped them book synchronous online courses, for example, by sharing Google Calendar invites with the team when booking for themselves. One of them frequently visited her teammate’s house, who had difficulty accessing the online learning platforms, and walked her through navigating and logging into the online platforms. They also repeatedly demonstrated the skills they were learning in front of the team. Trainees appreciated this support, with one expressing *“she’s busy, but she always finds the time she took the lead because she had some technical logical background already, and so she encouraged us to just jump into the pool...and we’ll be okay.”* In the final presentation, one team member talked about receiving and providing team support, *“We pick up where one leaves off... There were times when we wanted to give up because of what we didn’t know, but we encouraged each other not to... We learned you don’t have to be naturally gifted at computers when taking this training.”*

6.2.2 Open discussion on individual learning. While trainees took online courses individually, regular all-hands class huddles led by the Executive Director of the non-profit created a collective learning atmosphere among trainees. Huddles started with ice-breakers where all trainees took turns to introduce themselves and update each other on their lives. The director checked in with

all trainees and shared announcements and assignments. Teams then discussed their learning goals, progress, difficulties they faced, the support they needed and were receiving, and questions about the training. As one trainee said, these huddles were a *“confidence builder for everybody”* that made them all feel comfortable sharing and asking for help. For instance, another trainee said, *“they made me feel more at home... no question is a dumb question.”*

6.2.3 Check-ins through non-digital communication channels. Since the training was held during the COVID-19 pandemic, communication between trainers and trainees was mostly performed online. Due to trainees’ limited digital literacy, the lead author conducted regular check-ins through calls and text messages. These check-ins helped the research team (and the Director) understand and provide the necessary support to overcome the roadblocks trainees encountered when taking online courses individually (i.e., not knowing how to access the learning websites or schedules of the live sessions and personal circumstances that hampered their learning progress).

6.3 Use online resources that provide ‘live’ help

Trainees preferred online learning resources that offered live help. In training, the GetSetup platform, which provided a synchronous live session by an instructor, was preferred over the Bigger Brain platform, a pre-recorded video lecture platform. During live learning sessions, trainees could ask questions and get real-time feedback from instructors and other attendees. They felt more engaged in learning and had a sense of belonging while taking online courses individually. Taking live sessions required advanced scheduling and booking. Even when sessions were not offered at convenient times, trainees preferred to take live courses over asynchronous ones, sometimes taking courses in unusual places like on the bus or at the dentist because they did not want to miss the courses as some courses were not offered again within the training period. Additionally, while not synchronous, some trainees familiar with online search mentioned going to YouTube videos to learn certain features online. They explained that short video clips on YouTube were easily searchable and helped pinpoint what they wanted to know immediately. At the same time, it was easy to pause and apply the feature the video was explaining to their own tasks at hand on the spot. In contrast, pre-recorded video lectures were less preferred by trainees even though trainees could watch them at any time. For basic digital skills learners, online learning resources that provide live help to the questions trainees are prioritized over the time flexibility pre-made materials afford.

6.4 Provide hands-on practice

Hands-on practice, such as applying new skills on assignments or in their daily lives, was a particularly useful way to solidify what trainees were learning. For instance, many trainees cited the final team presentation using Google Slides as their favorite assignment, despite some experiencing anxiety in trial and error (e.g., clicking the wrong button and losing some content on the screen). Outside the training, some trainees also started to use their newly learned skills at work (which we describe in the next section). Others mentioned that they demonstrated and practiced with their family members (e.g., their children attending school remotely during the pandemic) and colleagues at work. This suggests

that applying their learned digital skills helps with retention and motivation.

6.5 Challenges trainees encountered during the training

6.5.1 Anxiety in learning new digital skills. As described in previous findings, trainees expressed feeling anxious about learning new digital skills. Some were self-conscious given their limited computer knowledge at the start, while others became more anxious when they realized that they did not know as much about technology as they learned more about computer skills. It was common for more digitally experienced trainees to feel "scared" when they were trying newly learned skills or "overwhelmed" when they felt that they had to understand all the new skills within the short time span of the training. For these reasons, we emphasized an open and caring environment during class huddles, trainee check-ins, and amongst team members. In future iterations of the program, we plan to share and discuss that anxiety about learning digital skills is normal and that anyone can experience it regardless of their existing skill or knowledge.

6.5.2 Personal life challenges. Throughout the training, many trainees took care of family responsibilities (e.g., attending to their children). As described in 6.2.1, some trainees suffered from unexpected life challenges such as a forced move or the illness of a family member. These personal circumstances and challenges posed additional obstacles to sparing sufficient time to learn and practice. Team support was crucial for keeping fellow trainees on track. Such challenges have been discussed in past work on entrepreneurship in a lean economy [9]. Unfortunately, these challenges tend to disproportionately occur among under-resourced community members. Our results suggest that collective learning environments could provide social support when taking online courses individually and help to increase the chances of retention, especially during personal life challenges.

6.5.3 Technical device/internet issues. Even though all trainees had their own computers and an internet connection at home, technical problems persisted and occasionally disrupted their learning such as tablet malfunctions, internet disconnection and restricted access to computers due to the move during the training. To address this challenge, ongoing technical support for managing hardware, software, and internet networks, would be useful. Access to common devices, such as a computer lab at the community center, can help trainees sustain their learning when such interruptions occur.

7 DISCUSSION

We presented a model for cohort-based basic digital skills training and preliminary requirements for training everyday community members as intermediaries to provide technical support in the community in the future (RQ1). To highlight the implications of our initial training outcomes: several trainees gained employment and utilized the digital skills they learned for everyday tasks (e.g., using emails instead of making calls); a veteran trainee who could no longer easily apply for benefits in person could now apply online after receiving training. Overall, our survey results showed an increase in self-efficacy in learning digital skills. We contributed three

best practices based on our initial pilot (RQ2) and three challenges trainees encountered during the training (RQ3). In the following, we discuss the implications for a community-based training model.

While online learning resources are known to be readily accessible, they have disproportionately benefited people with higher levels of education and skills [6, 10, 20, 30]. To provide basic digital skills training for community members, we designed a cohort-based training model that leverages online resources in partnership with an NGO. Our work shows a way to overcome the barrier of accessing online learning resources for basic digital skills through existing social capital within the community in two folds: 1) the Executive Director of the non-profit curated online learning resources based on the needs of the community and 2) more digitally adept trainees facilitated digital skills access and learning for other trainees. Traditionally, team-based learning is well-known for increased engagement in learning in education pedagogy [13, 15, 33] and is widely adopted in learning environments both online and offline [28, 36]. By leveraging team-based interactions in grass-roots online digital skills learning, we provide evidence of enhancing access to online basic digital skills learning resources and usage (with increased self-efficacy in digital skills) in a public housing community and extend previous HCI work on social/peer learning mechanisms [12, 37, 38]. As most resources for digital skills are delivered online, this onboarding support among community members is crucial in lowering the barrier to online learning, which has been called for in prior HCI work [7, 8]. We showed that embedding social learning support into our training model facilitated onboarding community members (especially those with little comfort using technology) to online learning and digital skills. We observed that more digitally knowledgeable members helped other team members access online learning platforms and learn digital skills. We believe that the trust and empathy they share as community members undergird this organic social support. Encompassing this support and coordination among trainees, our community-based digital skills learning model suggests the potential for intermediaries to mitigate the digital divide in the community. However, an open question remains about whether our model and initial findings generalize to communities with low social cohesion as our trainees were already socially connected.

8 CONCLUSION AND FUTURE WORK

To meaningfully reduce the digital divide among everyday people in the community, the digital skills gap should be addressed beyond the distribution of devices. We presented a collective digital skills learning model based on community assets that show potential to address the digital divide. This training model can be used to train intermediaries who provide tech support to other community members and function as a foundation for sustainable digital skills learning in the community. Our ongoing work includes identifying any additional skills and training requirements intermediaries need to support community members' digital needs effectively. Our early findings suggest soft skills that include interpersonal skills such as communication, patience, and how to work with specific members of the community, like seniors. To develop these soft skills, we plan to employ community-based experiential learning that includes

mock-client engagement, observing/shadowing actual job incumbents, diary entries, and collaborative best-practice documentation. Then, we will assess whether our pilot training program meets the actual technical support the community members need after deploying the trained intermediates to serve community members.

ACKNOWLEDGMENTS

This work was supported by NSF award CNS-2125012 and the University of Michigan's Poverty Solutions. We appreciate the feedback from our anonymous reviewers.

REFERENCES

- [1] 2021. HUD's Public Housing Program. https://www.hud.gov/topics/rental_assistance/phprog
- [2] 2022. Employment Dynamics in Detroit During the COVID-19 Pandemic. <https://detroitssurvey.umich.edu/wp-content/uploads/2022/02/DMACS-employment-dynamics-Feb2022.pdf> (2022).
- [3] Marcy Antonio, Alicia Williamson, Vaishnav Kameswaran, Ashley Beals, Elizabeth Ankras, Shannon Goulet, Ivy Wang, Grecia Macias, Jade James-Gist, Lindsay K Brown, et al. 2022. Targeting patients' cognitive load for telehealth video visits through student-delivered helping sessions at a United States Federally Qualified Health Center: An equity-focused, mixed methods pilot intervention study. *Journal of Medical Internet Research* (2022).
- [4] Borja Jerman Blažič and Andrej Jerman Blažič. 2020. Overcoming the digital divide with a modern approach to learning digital skills for the elderly adults. *Education and Information Technologies* 25, 1 (2020), 259–279.
- [5] Kathleen Carson, Stacey Wedlake, Matthew Houghton, Anisa Khoshbakhhtian, David Keyes, and Yvette Iribe Ramirez. 2021. *Digital Bridge: Providing Digital Access to Low-Income Job Seekers During the COVID-19 Pandemic*. Technical Report. Seattle Jobs Initiative.
- [6] Tawanna R Dillahunt, Zengguang Wang, and Stephanie D Teasley. 2014. Democratizing higher education: Exploring MOOC use among those who cannot afford a formal education. *International Review of Research in Open and Distributed Learning* 15, 5 (2014), 177–196.
- [7] Tawanna R Dillahunt, Nishan Bose, Suleman Diwan, and Asha Chen-Phang. 2016. Designing for disadvantaged job seekers: Insights from early investigations. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems*. 905–910.
- [8] Tawanna R. Dillahunt, Vaishnav Kameswaran, Linfeng Li, and Tanya Rosenblat. 2017. Uncovering the Values and Constraints of Real-Time Ridesharing for Low-Resource Populations. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (Denver, Colorado, USA) (CHI '17). Association for Computing Machinery, New York, NY, USA, 2757–2769. <https://doi.org/10.1145/3025453.3025470>
- [9] Tawanna R Dillahunt, Vaishnav Kameswaran, Desiree McLain, Minnie Lester, Delores Orr, and Kentaro Toyama. 2018. Entrepreneurship and the socio-technical chasm in a lean economy. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–14.
- [10] Maya Escueta, Vincent Quan, Andre Joshua Nickow, and Philip Oreopoulos. 2017. Education technology: An evidence-based review. (2017).
- [11] Emily Fisher. 2020. *Connect 313 Works to Bridge the Digital Divide in Detroit*. Retrieved January 17, 2023 from <https://detroitssit.com/connect-313-bridge-the-digital-divide-in-detroit/>
- [12] Rikin Gandhi, Rajesh Veeraraghavan, Kentaro Toyama, and Vanaja Ramprasad. 2007. Digital green: Participatory video for agricultural extension. In *2007 International conference on information and communication technologies and development*. IEEE, 1–10.
- [13] Paul Haidet, Karla Kubitz, and Wayne T McCormack. 2014. Analysis of the team-based learning literature: TBL comes of age. *Journal on excellence in college teaching* 25, 3-4 (2014), 303.
- [14] John B. Horrigan. 2016. *Digital Readiness Gaps*. Retrieved January 19, 2023 from <https://www.pewresearch.org/internet/2016/09/20/digital-readiness-gaps/>
- [15] Patricia Hrynchak and Helen Batty. 2012. The educational theory basis of team-based learning. *Medical teacher* 34, 10 (2012), 796–801.
- [16] Julie Hui, Nefer Ra Barber, Wendy Casey, Suzanne Cleage, Danny C Dolley, Frances Worthy, Kentaro Toyama, and Tawanna R Dillahunt. 2020. Community collectives: Low-tech social support for digitally-engaged entrepreneurship. In *Proceedings of the 2020 CHI conference on human factors in computing systems*. 1–15.
- [17] Barbara A Israel, Amy J Schulz, Chris M Coombe, Edith A Parker, Angela G Reyes, Zachary Rowe, and Richard L Lichtenstein. 2019. Community-based participatory research. *Urban health* 272, 2 (2019).
- [18] Barbara A Israel, Amy J Schulz, Edith A Parker, and Adam B Becker. 1998. Review of community-based research: assessing partnership approaches to improve public health. *Annual review of public health* 19, 1 (1998), 173–202.
- [19] Megan Kirk. 2020. *Detroit Seniors Gain Access to Technology with Connect 313*. Retrieved January 17, 2023 from <https://michiganchronicle.com/2020/11/05/detroit-seniors-gain-access-to-technology-with-connect-313/>
- [20] Irwin Kirsch, Anita Sands, Steven Robbins, Madeline Goodman, Richard Rannenbaum, et al. 2021. Hawaii Digital Literacy & Readiness Study. <https://labor.hawaii.gov/wdc/files/2021/11/Final-Statewide-Digital-Literacy-Survey-Report-from-Omnitrak-11.15.2021.pdf> (2021).
- [21] Yasmine Kotturi, Herman T Johnson, Michael Skirpan, Sarah E Fox, Jeffrey P Bigham, and Amy Pavel. 2022. Tech Help Desk: Support for Local Entrepreneurs Addressing the Long Tail of Computing Challenges. In *CHI Conference on Human Factors in Computing Systems*. 1–15.
- [22] Tharindu Rekha Liyanagunawardena, Andrew Alexander Adams, and Shirley Ann Williams. 2013. MOOCs: A systematic study of the published literature 2008-2012. *International Review of Research in Open and Distributed Learning* 14, 3 (2013), 202–227.
- [23] Uwe Matzat and Bert Sadowski. 2012. Does the "do-it-yourself approach" reduce digital inequality? Evidence of self-learning of digital skills. *The Information Society* 28, 1 (2012), 1–12.
- [24] Rachel Pleasants McDonnell, Shakari Fraser, and Felicia Sullivan. 2022. Digital Resilience in the American Workforce: Findings from a National Landscape Scan on Adult Digital Literacy Instruction. *Jobs for the Future* (2022).
- [25] Eli Newman. 2021. *The Digital Divide in Detroit: How the City is Working to Bridge the Gaps*. Retrieved January 17, 2023 from <https://wdet.org/2021/06/28/the-digital-divide-in-detroit-how-the-city-is-working-to-bridge-the-gaps/>
- [26] James Nicholson, Ben Morrison, Matt Dixon, Jack Holt, Lynne Coventry, and Jill McGlasson. 2021. Training and Embedding Cybersecurity Guardians in Older Communities.. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–15.
- [27] Ihudiya Finda Ogbonnaya-Ogburu, Kentaro Toyama, and Tawanna R. Dillahunt. 2019. Towards an Effective Digital Literacy Intervention to Assist Returning Citizens with Job Search. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) (CHI '19). Association for Computing Machinery, New York, NY, USA, 1–12. <https://doi.org/10.1145/3290605.3300315>
- [28] Sunay Palsol and Carolyn Awalt. 2008. Team-based learning in asynchronous online settings. *New Directions for Teaching and Learning* 2008, 116 (2008), 87–95.
- [29] Kimberly Pendell, Elizabeth Withers, Jill Castek, and Stephen Reder. 2013. Tutor-facilitated adult digital literacy learning: Insights from a case study. *Internet Reference Services Quarterly* 18, 2 (2013), 105–125.
- [30] Rachel Pollack Ichou. 2018. Can MOOCs reduce global inequality in education? *Australasian Marketing Journal* 26, 2 (2018), 116–120.
- [31] E Lee Rosenthal, J Nell Brownstein, Carl H Rush, Gail R Hirsch, Anne M Willaert, Jacqueline R Scott, Lisa R Holderby, and Durrell J Fox. 2010. Community health workers: part of the solution. *Health Affairs* 29, 7 (2010), 1338–1342.
- [32] Amartya Sen. 2014. Development as freedom (1999). *The globalization and development reader: Perspectives on development and global change* 525 (2014).
- [33] Rebecca J Sisk. 2011. Team-based learning: systematic research review. *Journal of Nursing Education* 50, 12 (2011), 665–669.
- [34] Alexander Van Deursen and Jan Van Dijk. 2011. Internet skills and the digital divide. *New media & society* 13, 6 (2011), 893–911.
- [35] Emily Vogels and A. 2021. Digital divide persists even as Americans with lower incomes make gains in tech adoption. *Pew Research Center* (June 2021). <https://www.pewresearch.org/fact-tank/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption/>
- [36] Alice A Whittaker. 2015. Effects of team-based learning on self-regulated online learning. *International journal of nursing education scholarship* 12, 1 (2015), 45–54.
- [37] Deepika Yadav, Anushka Bhandari, and Pushpendra Singh. 2019. LEAP: Scaffolding collaborative learning of community health workers in India. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (2019), 1–27.
- [38] Deepika Yadav, Pushpendra Singh, Kyle Montague, Vijay Kumar, Deepak Sood, Madeline Balaam, Drishti Sharma, Mona Duggal, Tom Bartindale, Delvin Varghese, et al. 2017. Sangoshti: Empowering community health workers through peer learning in rural india. In *Proceedings of the 26th International Conference on World Wide Web*. 499–508.