2013 46th Hawaii International Conference on System Sciences

Computer Training to Empower Day Laborers: A Heat Map to Address Emotional Barriers and Technical Skills

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Abstract

This paper analyzes the barriers to information and communication technologies (ICT) use among extremely underserved minorities such as impoverished immigrants in the USA. In particular, we explore the physical and psychological barriers that prevent Hispanic day laborers in Seattle from making effective use of computers and the Internet. Based on a mixed-methods study that combined structured interviews, focus groups and observations among day laborers members of non-profit Casa Latina in Seattle, WA, we suggest a typology of barriers to ICT. We also suggest the use of a heat map for ICT training that addresses both the physical access and the emotional capacity barriers faced by underserved communities. Addressing emotional barriers as well as technical skills is critical for these extremely underserved populations to make effective use of ICT in ways that effectively meet their information and development needs.

1. Introduction

The Internet is an embedded part of modern life in the United States, where mobile phones and Internet use has been considered in everyday-life situations of ordinary users who connect to it from their homes or shared places [1, 2]. Immigrants are considered a prominent component in the population of developed countries; in particular, the foreign-born population in the United States reached 40 million in 2010, an increase of 8.8 million since 2000 according to US Census data. Immigrants' quality of life can be enhanced by their use of information and communication technologies (ICT). Researchers at the University of Washington studied the experience of immigrant women in Europe and their use of ICT, suggesting that ICT can help enhance employability and well-being [3]. Furthermore, Internet use was found to enhance the economic and social participation and integration of immigrants in Spain [4].

Lack of access to computers and the Internet is only one of the aspects of the digital divide, which also includes dimensions of power, distribution of resources, people's skills and their capacity for effective use of ICT [5]. Studies of ICT for development have mostly focused on underserved communities in developing countries, but a very similar logic can apply to study the challenges to make effective use of ICT to improve the lives of poor and marginalized immigrants in the US. There is little understanding of the barriers associated with ICT use among immigrant communities, particularly the poorest groups among them. While some immigrants have thrived as successful contributors to the social, political and economic life of the US, many remain marginalized and impoverished. Some of the poorest immigrants work in precarious conditions as day laborers.

Day laborers are among the poorest and most vulnerable populations in the US. On a typical day, it is estimated that more than 100,000 day laborers seek work in construction, gardening, moving, cleaning and other low-skilled jobs in the United States, frequently congregating on street corners or around parking lots of construction warehouses where

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DOI 10.1109/HICSS.2013.142

employers pick them up for day jobs [6]. With few exceptions, they tend to have low levels of education, limited English-language skills, and they experience precarious conditions of employment with extremely low pay and high insecurity. To make matters worse, unscrupulous employers take advantage of the workers' precarious situation and withhold wage payments, pay them less than the minimum hourly wage established by law, and subject them to unsafe or unhealthy work conditions in violation of health and safety regulations. Violations of labor standards have become so prevalent that day labor centers have emerged in the US as a response to help protect the rights of day laborers. Casa Latina in Seattle is one of the oldest of more than 60 day labor centers that now exist in 15 states of the US. Casa Latina was founded in 1994 "to empower Latino immigrants through educational and economic opportunities" with a vision that the Hispanic community "participate fully in the economy and democracy of this country," according to Casa Latina's vision and mission (www.casa-latina.org).

This study seeks to understand the barriers that prevent Hispanic day laborers from making effective use of ICT, in particular their use of personal and public access computers (such as those found in public libraries and other community organizations). Hispanic Day Laborers speak Spanish as their native language, and come predominantly from Latin America. This project is part of a larger study that investigates the social and cultural benefits of ICT for community development for marginalized and underserved communities, both in the US and in developing countries. The results of this research offer a deep understanding of the ways in which Hispanic day laborers, who represent some of the poorest and most marginalized groups of American society, use or do not use computers and the internet to meet their information and other social and economic development needs. At the same time, the results offer a better understanding of the users' perceptions of the benefits (and negative consequences) of using ICT, and how service agencies such as Casa Latina and others can help remove the barriers to effective use of ICT for empowerment and development among underserved communities in the United States.

The authors take an interpretive approach to understand, from the day laborers' perspective, the barriers and opportunities to make effective use of computers and the Internet as part of their everyday lives. Gurstein defines effective use of ICTs as "the capacity and opportunity to successfully integrate ICTs into the accomplishment of self or collaboratively identified goals" [7]. Gurstein further posits that "the challenge with ICTs is not simply to provide passive "access" to the technology but rather to provide the means by which individuals in their communities can find ways of making "effective use" of these technologies for productive, wealth creating, and transactional processes.

Our research questions are: *What are the barriers to effective use of computers and the Internet among day laborers? How can service agencies better meet the needs of day laborers by enabling relevant training and access to computers and the Internet?*

The remainder of the paper presents an overview of the relevant literature, followed by the description of our research methods. We then present our findings, and conclude with a discussion of implications and future directions of work in the use of ICT for community development among underserved communities in the US.

2. Literature Review

The digital divide has been a widely discussed topic over the past two decades. Since the 1990s the term digital divide has been used to describe forms of unequal access to information and computer technologies such as computers and the internet [5]. During this time, the conversation has shifted its focus significantly from the concrete qualities of the divide to the individuals experiencing this gap and their lack of access, skills or interest in the technology [8]. Barzilai-Nahon emphasizes the multiple nature of the divide/s [5, 9], while van Dijk discusses how the unequal distribution of resources in society acts as a powerful determinant for digital divide through mechanisms of social exclusion, exploitation and control [10]. Also going beyond physical access to technology, Gomez suggests the ACE Framework (Access, Capacity and Environment) to study the use of ICT for human development. The ACE framework (Figure 1) studies the dimensions of equitable access (technology infrastructure and physical access, suitability, and affordability), human capacity and relevance (digital training of staff and users, meeting local needs, and social appropriation), and enabling environment (socio-cultural factors, political will & regulatory framework, and popular support), all of which offer a more comprehensive understanding of the uses and appropriations of ICT for social and economic development [11]. In our study we draw attention in particular to the Access and Capacity dimensions of the ACE framework.

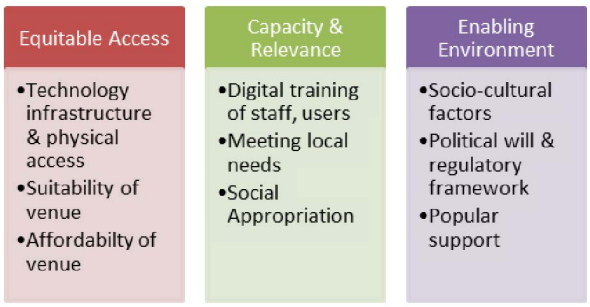

Figure 1: Schematic representation of ACE Framework

Numerous factors are associated with social digital divide within a country: income, education, family structure, age, race, geographic region, culture, social participation, psychological, and other factors (Yu, 2006). A social constructivist approach emphasizes on the social and cultural experiences of the people facing the divide, without denying that political and economic forces play an important par in it. Social constructivist approaches to study the information divide has been used by Agada [12], Chatman [13], Chatman and Pendleton [14], Hersberger [15], Sligo and Jameson [16] and Spink and Cole [17], among others. More recently, studies of ICT for development have also used social constructivist (or interpretivist) approaches, for example [18-22]. Like them, we adopt the social constructivist approach, as it is convergent with our interest in understanding the experiences surrounding ICT from the users' perspectives.

For a large proportion computer users in the US, Internet access has become a daily activity. Several scholars have explored the potential contribution of Internet use to strengthening social capital and civic engagement [20, 23, 24], which may be more important indicators of impact than traditional economic indicators [25]. In the case of immigrants, strengthening social capital and maintaining relations with friends and family in their home countries can be particularly important, in addition to building new relations and civic engagement as they get established in their new countries. Mobile phones and the Internet have been found to be crucial not only to take advantage of new job opportunities, but also for inexpensive and convenient communication with community members locally and back home [4]. Effective use of ICT offers practical information, job opportunities, and instrumental help as well as easy way to maintain social contacts. It is also an important source of emotional and social support for adaptation [4], and it offers a context in which immigrants can interact with similar others, to develop a sense of community and ease the ecological transition associated with relocation [26].

Studies of day laborers focus mostly on their labor, social, economic and health dimensions [6, 27], and little is known about their information needs, their use of ICT, and the opportunities to strengthen their use of computers and the internet in ways that help them improve their lives. Some of the few available studies of the information behaviors of migrant farm workers show that ICT is not very widely used by these populations. For these groups, "personal networks having various levels of credibility were used more readily than any other type of information source" [28]. Furthermore, ten years ago libraries were found to be irrelevant to the information needs of day laborers [29]. Marginalized and disadvantaged communities, as the case with immigrant day laborers, live in isolated information worlds rarely seeking information from the "outside" world thus perpetuating their information poverty [5].

Despite rich insights on the relationship between ICT use and immigrants' lives, we know very little about the use of ICT by some of the poorest and most marginalized groups of immigrants, day laborers. We therefore focus our discussion principally on barriers to the first step in becoming familiar with computers and the Internet, and suggest ways to overcome those barriers.

3. Research Methods

This study explored the uses and perceptions surrounding ICT among day laborers affiliated with Casa Latina, a social service agency in Seattle, WA. Casa Latina had around 400 active members at the time of the study, of which about 75% are men. Between March and June 2012 we conducted structured interviews with 94 day laborers, a focus group with six volunteer leaders, observations of nine introductory computer classes, and six in-depth interviews with trainees in the introductory computer classes. All data was collected in Spanish by native or near-native Spanish speakers. Interview and focus group questions revolved around the workers' uses and perceptions regarding mobile phones, personal computers and shared computers (at the library, at Casa Latina, or at other public venues), as well as regarding the services and benefits offered by Casa Latina. The structured interviews included 25% of the population of workers active with Casa Latina at the time, and offer a representative picture of the themes and trends identified. On the other hand, the focus groups, observations and in-depth interviews offer a rich understanding of the perceptions and experiences of the workers in relation to the topics

studied. The combination of both quantitative and qualitative data enhances the trustworthiness and credibility of the findings.

An iterative process of analysis inspired in grounded theory was used to elicit emerging themes and trends, which were discussed and probed further among members of the research team. We followed the "ladder of abstraction" approach [30] in analyzing our data (Figure 2). This approach has the advantage of simplicity, while at the same time also being systematic and exercising a certain level of rigor in data interpretation. In an iterative approach to analyze the focus group data in particular, we started with individual coding of the transcripts, and then combined the coding schema identified by each member and returned to revisit the focus group transcripts, observation notes, structured interview transcripts, and observation and in-depth interview notes. This spiral process was continued until agreement was reached regarding the themes and principles here presented.

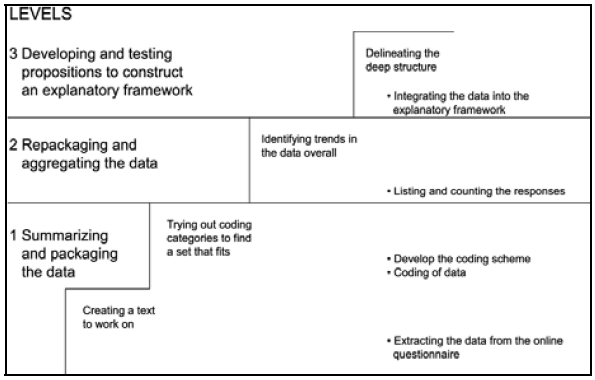

Figure 2: Ladder of abstraction (based on Carney, 1990)

Final analysis was conducted in English by the authors, with contributions from graduate students at the University of Washington Information School. Before finalizing this paper, findings were presented to the staff and workers at Casa Latina, who corroborated the salience of the findings and the relevance of the insights that emerged in the study.

4. Findings

Hispanic day laborers are among the most marginalized and underserved members of society: they live a life full of uncertainty, with precarious employment that they obtain one or two days at a time, and with little or no support networks in place to help them at times of need. Casa Latina is a service agency that offers day laborers a safe space to gather and look for jobs, without the uncertainties and insecurities of waiting unsheltered, outdoors, on the street. Casa Latina also offers training opportunities to its members: English as a second language (ESL), job safety, workers' rights, and more recently, use of computers. About 400 day laborers per year are members and regularly return to Casa Latina because it offers more than job dispatch: it offers training opportunities, and it also offers them a sense of community that they can belong to.

Figure 3 presents the age and gender distribution of day laborers interviewed at Casa Latina:

The center provides its members a secure location for the members to wait for work. While they wait for notification of work, they provide a community infrastructure that supports all the members but primarily benefits those not able to find work on a certain day. Additionally, the center is a secure place for the members to spend the day and meet people who speak the same language without being left exposed and in danger. While 79% of the members go to Casa Latina primarily to seek jobs, only 47% of the members place the highest value of their membership on the jobs they get dispatched: training opportunities are the most important benefit for 27% of the members we interviewed, while meeting others and building trust are considered most important for 11% and 10% of them, respectively. The sense of community was evidenced on the day we presented our findings to the workers' assembly: they were discussing and agreeing to dedicate a significant portion of the $4,000 held in their "solidarity fund" (a fund made of voluntary contributions by workers who pay $1 per day they get work through Casa Latina, or $2 per month), to

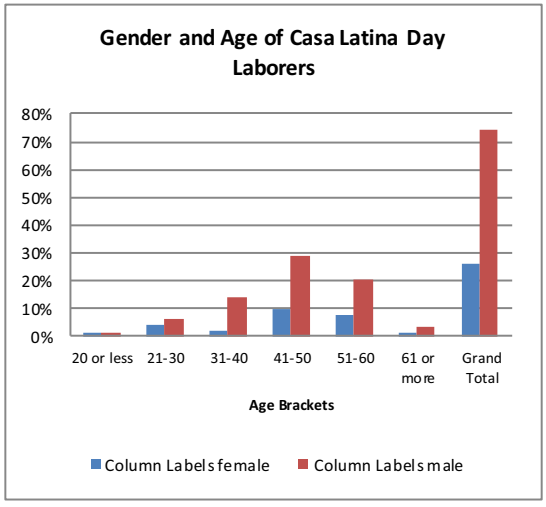

Figure 3: Gender and Age of Casa Latina Day Laborers

support one of the members' son in need of legal assistance. They feel the community is there for them at times of need. In the words of one of the interviewees, "these are my people; I come here to be with my people."

4.1 ICT Uses

Despite the very low socio economic status of the day laborers, they show high levels of ownership and use mobile phones, and to a lesser extent, of computers. We studied their experiences of use of three different technological artifacts: shared computers, personal computers, and mobile phones. Shared computers are available in public places such as libraries, community centers, schools, and even technology stores (some workers noted they go to the Apple store and use computers there). Personal computers (PCs) are owned by the workers or their families, and they are used to connect to the internet either at home (dialup, wireless, broadband) or in public places where Wi-Fi is available (such as a public library, coffee shop/store or similar). Finally, in the case of mobile phones, we paid particular attention to the uses of internet-enabled phones (smart phones), which can have data plans with the wireless carrier, or allow their user to connect to public Wi-Fi.

Almost all of the day laborers we interviewed (86%) own a cell phone (and 100% of the women we interviewed own a cell phone). The strongest benefit of owning a cell phone is to be called by prospective employers: repeat business is a sign of success, even if it means less jobs dispatched through the formal process of Casa Latina. An employer who likes the work can contact the worker and hire him or her again, directly. Secondary benefits of the mobile phone include communication with family and friends, and being available in case there is an emergency at home, at the children's school, or with their family in their countries of origin. While almost all workers use the phone daily for voice calls, only about half the workers use text messages (SMS) daily (43%) or weekly (12%), and internet data is used regularly by only 25% of them: 66% have never used any internet data on their phones, and 27% have never used any text messaging. 31% of the cell phone users have a basic phone (no features), while 30% have a smart phone. 39% of them have a "feature phone," i.e., one with camera or music player.

Computers, on the other hand, are less frequently used and even less frequently owned than mobile phones, as described in Figure 3. While 67% of respondents use computers, only 39% own one, and 46% use a shared computer, mostly at the public

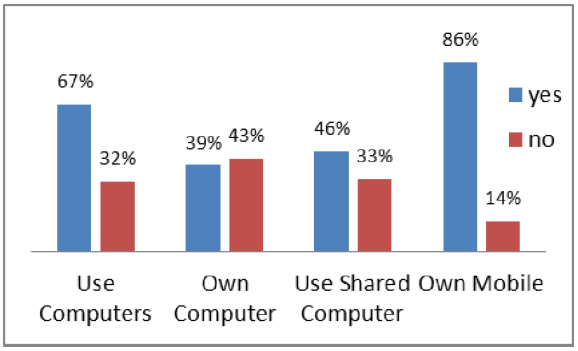

Figure 4: ICT ownership and use among day laborers

library (69% of users of shared computers use them at the library). Some respondents use both personal and shared computers.

4.2 Barriers to ICT Use

The most common barrier to using computers and the Internet is not knowing how to, according to interview respondents. Lack of skills is reported as the most important barrier by 45% of the workers. For example, one of them says "I don't know how to move the arrow." Statements about their lack of skill frequently combine English language skills and computer skills: "I don't know how to use the language and the technology," or "my limited English, since most of the programs (sites) are in English." Other important barriers reported include lack of time (13%), not owning a computer (13%) and cost (10%).

Interestingly, 19% of the respondents claimed they have no barriers to access and use computers and the internet. These "power users" can become peer trainers and "infomediaries" to help others harness the benefits of ICT. Infomediaries (or lay information mediaries) are individuals who serve as brokers or transferors of information, especially helping those who cannot make use of ICT by themselves [31-33]. The idea of turning power users into infomediaries was enthusiastically embraced by the workers assembly when we presented our results.

A closer examination of the experiences of using computers and the Internet, obtained through in-depth interviews and, in particular, the focus group discussion, allows for a more in-depth understanding of the barriers to computer use perceived by the day laborers. Using the ACE framework as a starting point, we group barriers faced by day laborers to use ICT under two categories: access barriers, and capacity barriers.

Access barriers include having access to equipment and access to the internet, as well as more subtle perceptions of the convenience of these situations and having the time to learn and use the ICT tools in question.

Capacity barriers include skills to use the equipment and information (digital literacy skills), as well as other emotional barriers faced by the day laborers: fear and anxiety of using expensive equipment, uneasiness in using something new to them, and low self-confidence or trust in being able to use the tools.

The self-evident physical barriers of access to equipment and to the internet, and the obvious capacity barrier of digital skills to use the ICT resources are present in the day laborers' experience at Casa Latina. But what our findings highlight is the importance of other emotional barriers that have rarely been reported in the literature: convenience, time, fear, ease, and self-confidence. To fill this gap, we suggest a detailed typology of emotional barriers to ICT use as described by the day laborers in our study, summarized in Figure 5.

5. Discussion: Opportunities for ICT Training

The computer training program had just started at the time we were conducting our fieldwork, but there was already a lot of enthusiasm about it among the workers at Casa Latina. The six computers purchased through a grant by the City of Seattle, and the computer lessons offered for an hour twice a week to beginner and intermediate users, are starting to address the first level of barriers expressed by the workers: they now have access to computers connected to the Internet, and they are starting to acquire the digital literacy skills to be able to use them effectively.

Nonetheless, finding such a strong perception of emotional barriers such as convenience, time, and especially, fear, familiarity, and self-confidence, calls into question the focus on physical access and digital literacy skills alone in the ICT training program for day laborers, and for underserved communities in general.

Related findings have been reported by Garrido et.al., who analyze the importance of personal factors such as sense of self, workplace readiness and extended networks in understanding the relationship between ICT training and employability [3], while Prado & Williams include individual cognitive and emotional challenges for telecenter users in the Dominican Republic [34]. The field of cognitive science is working towards understanding the complex emotional system and how our body responds to emotions. Sylvester suggests that emotions drive learning and memory, and indicates

Access Barriers	Capacity Barriers
Access to Equipment Access to shared computers, personal computers and mobile phones. *"I now own a laptop" "I have owned a mobile phone for 2 years"*	**Digital Literacy** Level of proficiency in using technology tools and information resources available, including language skills. *"I consider myself a beginning computer user."*
Internet Access Access to the Internet via dialup, broadband, wireless, Wi-Fi plazas. *"I don't have dedicated Internet access, so, I go with my laptop to the public library to use their Internet connection via Wi-Fi."*	**Fear & Anxiety** Emotional response of distress regarding technology use. Apprehension that can be associated with fears of breaking equipment. *"I don't know how to use the computer, what if I break it."*
Convenience Location and availability so ICT can be integrated into regular schedule and daily life. *"It is convenient for me to use computer at Casa Latina since I am already there for the English classes."*	**Ease** The level of comfort the user feels when interacting with the technology. *"When I see others interacting with technology, I find this process attainable and easy for me"*
Time Having time to learn and use ICT; time it is available for use (at the library there is a limit of 30-90 min). *"Depending on when I get out of work, if I have time, I can go to the library to use the computers."*	**Self-confidence** Believing that they can do it, or that they will get support from others in a safe, non-threatening environment. *"I expect that you will help guide me in the right direction."*

Figure 5: Barriers to ICT use

that emotions exist along a continuum; they drive our attention, which drives learning and memory: "emotion is more powerful than logic or reason" [35]. Furthermore, Akbiyik states that not only is learning associated with our cognitive abilities but also "emotions, prejudices, self-efficacy & social needs" [36].

We suggest a heat map for ICT training, in order to help better understand the opportunities for most urgent and relevant ICT training among underserved populations. The heat map allows us to establish the highest needs in terms of physical access as well as capacity barriers, with attention to the emotional dimensions expressed by the day laborers at Casa Latina. For simplicity, the heat map can be represented in a 2x2 matrix (Figure 6), in which levels of physical barriers can be plotted in relation to levels of capacity barriers (with the emotional dimensions included in each one). The result is a heat map that helps to establish priorities in training to attend to the most important barriers of any given individual or group, to help them move from a novice to a proficient user of ICT by minimizing access and capacity barriers, with attention to physical and emotional dimensions. In this way, marginalized populations such as the day laborers served by Casa Latina will be able to learn to use computers and the internet in a meaningful way. Further analysis of the possible and actual uses of ICT tools, and of the benefits derived from such use, is developed elsewhere (in progress).

Our findings point to a number of important factors that service organizations and policy makers could consider when developing digital inclusion policies or programs to help bridge the digital divides. Most often, these programs focus on solving physical barriers, as discussed above. While overcoming physical barriers (including computer and internet access, and digital literacy skills) is important, it is not enough if programs are to include the most extremely marginalized members of society, as is the case of day laborers. In addition to physical barriers, emotional limitations such as perceptions of convenience and availability of time, as well as overcoming fear and anxiety, improving self-confidence, and making it easy for individuals to "see themselves" as prolific users of technologies, are important dimensions that need to be accounted for. All the aforementioned can be considered when designing support systems for immigrant day laborers, as well as other marginalized groups in society.

Heat Map for ICT Training		**Access Barriers** (equipment, internet, convenience, time)	
		High	Low
Capacity Barriers (digital literacy, fear, ease, self-confidence)	High	I **Non user:** completely novice	II **Beginner user:** Train to gain skills and reduce fear
	Low	III **Eager user:** access to computer labs	IV **Power user:** can become an infomediary

Figure 6: Heat map for ICT training

By using the ICT training heat map, organizations such as Casa Latina can focus more of their efforts on training the ones with the highest barriers (quadrant I, non-users or completely novice users), and in doing so, combine offering both digital literacy skills as well as opportunities for the workers to learn to cope and reduce their fear, anxiety and sense of powerlessness in the face of computer technologies perceived to be foreign. In the same way, once they differentiate beginner users (quadrant II) from eager users (quadrant III), they can offer specific services to each one of these types, with particular attention to addressing their emotional barriers.

While the needs of the eager users, who may experience difficulty finding a convenient time and location to use ICT, can be met by offering access to shared computers at their venue with minimal supervision, the needs of the beginner users, who may experience difficulty facing their fear and anxiety in relation to the technology they have easier access to, can be met by offering targeted training that de-mystifies the technology and enhances their self-confidence to be able to use it. As a result, both eager users and beginner users will become more self-sufficient and proficient users of ICT, eventually becoming relative "power users" (quadrant IV), where they can become infomediaries, and a source of support and inspiration to their peers.

In other words, by empowering Casa Latina to identify the scope of barriers and levels of access their users possess, they can design and offer in-house trainings to do the following:

- Help members with emotional barriers. (i.e., ways to address and eliminate the fear from breaking the physical equipment).
- Increase the awareness of different ways to access shared computers. (i.e., ways to access internet through free Wi-Fi or access discounted internet plans through service providers).

- Provide step-by-step guides to help access and use services offered on the internet. (i.e., how to use online translation, how to look for bus schedules or locate addresses on a map, etc.)

This approach would be useful in helping the users with the highest barriers gain the necessary access and skills, as well as self-confidence and sense of ease. Through mutual help and peer support, this would also help community members who desire to overcome the barriers by themselves.

6. Conclusions

The goal of this research was to better understand the barriers to effective use of computers and the Internet among day laborers, in order to help service agencies better meet the needs of day laborers by enabling relevant training and access to computers and the Internet. We have discussed how Hispanic day laborers served by Seattle service organization Casa Latina use ICT tools such as mobile phones, personal computers, and shared computers. We described the barriers experienced by the day laborers, who represent some of the most marginalized and excluded sectors of our society, and highlighted how they experience strong emotional barriers in addition to physical barriers to access and use computers and the internet. By suggesting a typology of barriers, organized using the categories in the ACE Framework under Access barriers and Capacity barriers, we offer a deeper understanding of the difficulties faced by these underserved populations if they are to make effective use of ICT resources. We suggest a heat map for ICT training to help guide Casa Latina and other similar service organizations to identify and provide more relevant training that recognizes the different types of needs experienced by users.

These findings can be put to practice in a wide variety of settings where ICT training and use is sought to help bridge the digital divide and offer opportunities to marginalized and underserved groups to take advantage of ICT resources. Our investigation invites the consideration of less techno-centric ways to address training and support programs for those who are not proficient users of computers and the Internet, and offers a practical tool, an ICT training Heat Map, to help better design and implement ICT training initiatives for underserved populations. Future work can explore the emotional barriers experienced by marginalized communities such as immigrant day laborers, and design computer training materials that does not just deal with teaching the technical skills but with reducing the emotional barriers faced by underserved communities such as Hispanic day laborers to make effective use of computers and the Internet to meet their information needs and to improve their lives.

Acknowledgements: We thank all the workers, staff and volunteers at Casa Latina for their invaluable contribution to this study.

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