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Improving ICT Use within the Underserved Community: Empowering the Non-Native English Speaker

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ABSTRACT

Access to electronic information resources remains a problem for underserved communities, especially non-native English speakers. Diffusion of technology and alternate low-cost methods to capitalize on technology's potential are needed to reach populations with limited resources. This research places emphasis on a training approach to maximize message content and information exchange targeting subpopulations in underserved communities. The proposed approach leverages findings from a Spring 2007 study, which utilized a web-based training application to obtain pre-training and post-training measures from community responders including participants from the proposed subpopulation.

Keywords

Digital divide, diffusion of technology, mobile technology, text messaging, individual preparedness, community.

INTRODUCTION

Access to electronic information resources remains a problem for underserved communities, especially non-native English speakers. Two critical dimensions of information technology diffusion and the digital divide include: 1) access to electronic information resources; and 2) sophisticated skills to utilize electronic information resources (Eng, Maxfield, and Patrick, 1998). Pew Internet 2007 reports language as yet another barrier to the digital divide (Pew Internet), creating a third critical dimension for the non-native English speaker, such as the Hispanics/Latinos. Limited research exists to examine distinct barriers by subpopulation (Lorence and Park, 2006) and is the premise of this research. For example, "little research has been done to differentiate levels of health information access on the Web by different subgroups, linking online socioeconomic characteristics and health seeking behaviors." (Fox and Livingston, 2007).

The affordability of desktop computers coupled with the lack of a long-term residential domain are other dimensions that continue to inhibit the penetration of high speed Internet access for these communities. In contrast, "the potential of mobile phones to disseminate news, medical information, education, and emergency services to vast numbers of underserved people in poor, rural areas and calls this promise a real revolution" (Gomez, 2008; Benjamin, 2006). Moreover, access to the Internet is gradually improving through wireless devices (cell phones and smart phones), especially for the underserved individual who uses a mobile device for phone service in lieu of a landline.

This research focuses on the skills needed to maximize access to electronic information resources from a mobile device. We place emphasis on the underserved community; particularly the Hispanics/Latinos who are also confronted with language barriers. Leveraging a Spring 2007 study and web-based training application, this research continues to focus on low-cost mobile devices (primarily cell-phones and smart phones.) Through plain language training, leveraging Speech Act Theory, the upcoming study seeks to improve information exchange (message content). The objective is to establish a training baseline for non-native English speakers leveraging the plain language techniques employed in the initial Spring 2007 study. The upcoming study, targeted for Fall 2009, will use the web-based training application developed for the Spring 2007 study. Application modifications to better suit the subpopulation of non-native English speakers, namely Latinos/Hispanics is the focus.

Following the introduction, this paper begins with a brief review of the literature focusing on the digital divide in the United States and the use of mobile devices in the underserved urban community. A short review of mobile technologies, namely SMS text-messaging is presented before introducing the importance of the next studies training focus. Findings from the Spring 2007 are leveraged as part of the upcoming study and also next steps of this research.

LITERATURE REVIEW

Technology Diffusion and the Digital Divide

Improving access to valuable electronic information on the Internet to lessen the digital divide is but one example challenging the underserved community. The diffusion of information technology and the digital divide takes place along two axes: between countries (high versus low income) and within countries (individual technology diffusion correlated with country diffusion). The diffusion of technology as reported by both the United Nations and World Bank reports (Figure 1) are consistent in reporting that high-income countries remain at the forefront of technology diffusion although the gap is lessening over time (UN, 2005; World Bank, 2008). “A person in a high-income country is over 22 times more likely to be an Internet user than someone in a low-income country. In spite of their rapid growth in developing countries, mobile phones are 29 times more prevalent in high-income countries than low and high-income countries as mainline penetration is over 21 times that of low income countries.” (UN, 2005).

Income groups	Internet users per 1,000 people 2003	Mobile phones per 1,000 people 2003	Telephone mainlines per 1,000 people 2002
High	366	698	575
Upper middle	209	355	211
Lower middle	62	195	144
Low	16	24	27
World	150	223	176
Source: World Bank (2006).			

Figure 1. ICT Diffusion Index 2005 by Income Group (International)

Closing the gap of the digital divide can place emphasis on numerous technology limitations, socio-economic resources and location (local or global, urban or rural). The term "digital divide" is used to describe the discrepancy between people who have access to and the resources to use new information and communication tools, such as the Internet, and people who do not have the resources and access to the technology (Webopedia, 2008). Moreover, the discrepancy in skill set between those who have the skills, knowledge, and abilities to use the technologies and those who do not is a factor. The digital divide can exist between those living in rural areas and those living in urban areas, between the educated and uneducated, between economic classes, and on a global scale between more and less industrially developed nations. (Webopedia, 2008)

The diffusion of technology and ability to straddle the digital divide can be approached from a global or local perspective. One local example of a United States (local) initiative is a roundtable held in July 2007, which discussed real-world challenges of promoting community health. Two primary recommendations from the roundtable that could benefit from the use of information communication technology are: 1) to promote community-based participatory research (CBPR) within and outside of the CDC (Centers for Disease Control and Prevention); and to promote a state-of-the-art e-mechanism to share expertise and knowledge about community health promotion (Tucker and Navarro, 2007). Recent research suggests that online information can have a positive impact on consumers’ health care. However, for some underserved demographic groups, a “digital divide” (a gap in access to digital information) exists (3), despite numerous technologic initiatives to reduce this gap. CDC could provide leadership by identifying the characteristics and needs of digitally underserved populations and allocating adequate resources to address the identified needs. CDC’s role could include engaging nontraditional partners, such as information technology corporations and the U.S. Department of Commerce’s National Telecommunications and Information Administration, in efforts to initiate new strategies for helping populations gain access to information. More people could then participate with their providers in making important decisions about their health and well-being.

Examples such as the roundtable recommendations demonstrate alternate ways to reach communities with technology. The role small grassroots organizations play is essential and can “raise people’s awareness of new technologies and the benefits that they can bring, with a special focus on the disadvantages and vulnerable groups such as the poor, the illiterate, older persons, women, youth and people with disabilities.” (Zukang, 2007).

Appendix Table 1: Internet Use from Any Location by Individuals Age 3 and Older, September 2001 and October 2003 and Living in a Home with Internet Broadband Age 3 and Older, October 2003

	Internet Users (Percent)		Lives in a Broadband Household (Percent)
	Sept. 2001	Oct. 2003	Oct. 2003
TOTAL POPULATION	55.1	58.7	22.8
Gender			
Male	55.2	58.2	23.9
Female	55.0	59.2	21.8
Race/ Ethnicity^a			
White ^b	61.3	65.1	25.7
White Alone	n/a	65.1	25.7
Black ^c	41.1	45.6	14.2
Black Alone	n/a	45.2	13.9
Asian Amer. & Pac. Isl. ^d	62.5	63.1	34.2
Asian Amer. & Pac. Isl. Alone	n/a	63.0	34.7
Hispanic (of any race)	33.4	37.2	12.6
Employment Status			
Employed ^e	66.6	70.7	26.0
Not Employed (unemployed or NLF) ^e	38.0	42.8	16.1
Family Income			
Less than \$15,000	25.9	31.2	7.5
\$15,000 - \$24,999	34.4	38.0	9.3
\$25,000 - \$34,999	45.3	48.9	13.4
\$35,000 - \$49,999	58.3	62.1	19.0
\$50,000 - \$74,999	68.9	71.8	27.9
\$75,000 & above	80.4	82.9	45.4
\$75,000 - \$99,999 ^f	n/a	79.8	36.8
\$100,000 - \$149,999 ^f	n/a	85.1	49.3
\$150,000 & above ^f	n/a	86.1	57.7

Figure 2. Internet use by Individuals (United States)
Source: Cooper and Galleghar (2004)

Underserved (disadvantaged) populations also face many health challenges in addition to overall living conditions. “New Census information shows that more Hispanics/Latinos now live in urban areas than at any time.” The Center for Disease Control also notes that “research is needed to develop intervention models that produce effective, sustainable improvements in urban health and quality of life for Hispanics/Latinos.” (Fox and Livingston, 2007). Underserved populations Internet use has been significantly low dating back to a 2001 report (Figure 2), where Hispanic Internet Users are 33.4% and White Internet Users are 61.3%. In contrast, the use of mobile phones (Table 1) by the same populations is increasing, providing one vehicle to straddle the digital divide. With small devices and limited capacity along with limited phone/text plans, the non-native English speaker is more challenged for access to resources.

Mobility and the Underserved Urban Community

Short message service (SMS) text-messaging, true to its name is an exchange protocol whereby command driven (syntactic) language is exchanged in 160 character segments. SMS text messaging is a form of written communication that exchanges packets of information between information communication technologies (McAdams, 2006). To-date the use of SMS for alert notifications is rapidly increasing in the United States with colleges under the spotlight in response to the Virginia Tech massacre and recent campus shootings in Illinois. Current use for alert notifications remains as one-way communication for natural disasters from a global perspective are another focus.

The 160 character limit shows promise as a favorable choice for the non-native English speaker both as an affordable first step and as a mechanism to exchange critical information. Couple the ability to exchange smaller segments of text with the limited resources of the urban Latinos and the potential to reach these communities of need increases. Introducing a simplified way to leverage SMS text-messaging and keywords across the Internet to maximize information results (response) can empower individuals who have limited command over the English language.

Plain Language and Speech Act Theory

The plain language movement is now an international initiative and aims for the clear and concise communication needed to convey critical information. Plain language offers promise as an approach for mobile device communication. Plain language is best defined as clear, straightforward expression, using only as many words as are necessary and avoids obscurity, inflated vocabulary and convoluted sentence construction (FEMA, 2005). The premise of plain language is to improve accuracy, certainty, and precision. Plain language is being adopted for use with governmental grants and procedures (PL, 2006), such as National Institute of Health (NIH). Plain language provides a written language base for effective communication protocols. How to best introduce plain language use and provide training relies on a delivery mechanism. For this research, Speech Act Theory is leveraged as the delivery mechanism (task prompts) to invoke message responses with the 160 character text-message limit. Speech Act Theory, initially introduced by Austin (1962) and thereafter expanded upon by Searle (1969), addresses the differences between sentences expressing commands, the differences between sentences and statements, along with other utterances.

Speech Act Theory capitalizes on the formation of utterances. Because the focus of this research is based on assisting individuals who exchange information based on a specific need, the Illocutionary Speech Act rules of Speech Act Theory were leveraged (Austin, 1962; Searle, 1969). Our training modules were designed around the six Illocutionary Acts leveraging plain language training techniques that paralleled each Illocutionary Act.

SKIPPING PAST THE DESKTOP: ALTERNATE INTERNET ACCESS

A Latinos report by Pew Internet research from March 14, 2007 is presented in Table 1. These findings coincide with the findings of increased cell phone use where Pew Hispanic/Pew Internet reports that six in ten Latino adults have a cell phone and half send or receive text messages (Fox and Livingston, 2007). The report looks at the numbers in a different way, 56% of Latino adults go online, 18% of Latino adults have a cell phone but do not go online, and 24% of Latino adults have neither a cell phone nor an internet connection. Cell phone ownership is associated with essentially the same demographic characteristics as internet usage. For example, cell phone use is markedly lower for Spanish-speakers: 42% have a mobile phone, compared with 75% of English-dominant Latinos. Native born Latinos are more likely than foreign-born Latinos to use a cell phone – 72% versus 50%. However, Latinos over age 60 are more likely to have a cell phone than an internet connection, which is also true in the non-Hispanic population.

Latinos are also accessing the Internet by cell phone. More than half of Latino adults (59 percent) have a cell phone and almost half (49 percent) of Latino cell phone users say they send and receive text messages on their phones. On the flip side, a quarter of Hispanic adults have no cell phone or Internet connection.

Latinos Online: Summary of Findings at a Glance
Fifty-six percent of Latinos in the U.S. use the Internet.
Just one in three Latinos who speak only Spanish go online.
Differences in levels of education and English proficiency explain much of the different in Internet usage between Hispanics and non-Hispanics.
Latinos are less likely than whites to have an Internet connect at home.
Some Latinos who do not use the Internet are connecting to the communications revolution in a different way – via cell phone.
Source: Susannah Fox and Gretchen Livingston. Latinos Online. Washing, DC: Pew Hispanic Center/Pew Internet & American Life Project, March 14, 2007.

Table 1. Latinos Online Usage

Socio-economic differences in the composition of groups explain Internet usage between Hispanics and non-Hispanics (Fox and Livingston, 2007). These characteristics are often intertwined, especially in the foreign-born Hispanic population. Often it is difficult to isolate socio-economic conditions from language and is an important element for the upcoming study. Demographics, such as race, education, income and English abilities also need to be included in the upcoming study to better identify and assess the proposed baseline for training and practice of the Hispanic/Latino subpopulation.

ADAPTING TRAINING FOR SUBPOPULATIONS

A web-based application that obtained pre-training, and post-training text-based responses was developed for a Spring 2007 study. The study of 50 participants placed emphasis on local community responders (Gomez, 2008). The training application, used a repeated measures design, was accessible from an individual's web browser with an assigned login id. All instructions were part of the application and required no voice or text intervention outside of the application. The study participants were individuals from both rural and urban areas, a range of age, and a range of socio-economic conditions (income and education level).

The focus of the training was to provide plain language training adapted for the 160 character length of an SMS text-message. The use of Illocutionary Speech Acts (Table 2) served as the task prompt. The multimedia application provided a simulation of a cell phone for an element of realism and posits to extend application use to an actual cell phone for SMS text-messaging after training. A crisis scenario relevant to community responders was developed and was used for the entire training. As the scenario unfolded, a series of tasks were introduced that invoked task responses, six per participant (see below) in the form of SMS text-messages (simulated). The results of the study reflected improvements between pre-training and post-training task responses (SMS text-message content).

Discussion for Future Research by Sub-Population

Further analysis and observations noted differences between study participants, especially by age and non-native English speakers and will be the basis for the upcoming study (target of Fall 2009). Within the crisis scenario and repeated measures design are six tasks per study participant (Table 2-Task Assigned). Three of the six tasks are before plain language training is introduced. The other three tasks are post-training. Our discussion is based on task 2 and task 4 which are parallel tasks eliciting the use of the same Illocutionary Act (Advise and Ask for) and used as the task prompts for the Spring 2007 study.

Illocutionary Speech Acts – Task Assignments		
Illocutionary Acts	Essential Rule	Task Assigned
<i>Asking or answering a question</i>	<i>Performance of an act in saying something where a certain effect is achieved</i>	
Assert (confirm)	Counts as an undertaking to the effect that <i>p</i> represents an actual state of affairs.	Pre-Train Task 1
Warn	Counts as an undertaking to the effect that E is not in H's best interest.	Post-Train Task 3
Advise	Counts as an undertaking to the effect that A is not in H's best interest.	Pre-Train Task 2
Question (ask for)	Counts as an attempt to elicit this information from H.	Post-Train Task 4
Thank	Counts as an expression of gratitude.	Pre-Train Task 2b
Request	Counts as an attempt to get H to do A.	Post-Train Task 5

Table 2. Speech Act to Task Assignment Mapping

A response level code, with values ranging from 1-4 (lowest- to highest) was assigned to each participant response (Table 3 and Table 4). Participants 1 and 2 were experienced community practitioners while participants 3 and 4 were inexperienced community practitioners. As noted in the task prompt for Task 2 and Task 4, each participant response contained two parts per message. In comparing the participant responses 1 and 2 with a response level of 4 to the participant responses 3 and 4 with a response level of 1, the difference in message content is clearly noticeable. The response level 4 message content contained information that was useful to the scenario presented.

Alike when comparing the same participant’s response between the pre-training (Table 3) and post-training (Table 4) tasks, the message content itself did improve. A further review of the improvement in message content reflects the use of plain language training introduced yet the actual content was lacking in terms of rich content. The sample that is provided is a representation of what was noticed during the analysis and coding of response level. The pre-training response level 1 and some response level 2 study participants could benefit from a training application which provides additional background on language use, has additional practice exercises associated with second language learners.

Task Prompt 2

1. Advise about Route 80 road closure.
2. Ask for detour directions from your current location to your assigned neighborhood.

Participant Number	Participant Response for Task Prompt 2	Response Level
1	I am a bit lost here. I had to make a detour - route 80 is closed. I am sitting at the corner of Broad st and Karen dr in Clifton. I need directions from here	4
2	I-80 closed, detoured onto Rte 19, now at Broad and Karen in Clifton, need directions to assignment.	4
3	joe i need instructions	1
4	Rt. 80 is closed and the location you are you cannot locate the street number so he can help you get to your assigned neighborhood.	1

Table 3. Pre-Training Task Responses

Task Prompt 4

1. Advise that you are now at the last house of your assigned neighborhood.
2. Ask for medical resources to help a resident with breathing difficulties.

Participant Number	Participant Response for Task Prompt 4	Response Level
1	At last house. Send ambulance for resident having breathing difficulties. Flooding intensifying, wind picking up, darkening skies.	4
2	At last assigned house. Need medical help for resident with breathing problem.	4
3	I will try to work with them. I will call for help. while we wait for someone, i will try to make her feel well.	1
4	approched last house on orchard street. enter house notice elderly alone with son. indictes son having trouble breathing. Need medical resources to aid.	4

Table 4. Post-Training Task Responses

The next steps of this research and analysis in preparation for the upcoming study suggest a continued focus on the use of plain language as a way to maximize information exchange for underserved communities straddling the digital divide. Placing emphasis on syntactic language (text-message content) parallels the use of search engines leading to accurate result sets, an important characteristic for low-cost mobile devices with limited capabilities.

CONTRIBUTIONS AND CONCLUSION

This paper presents a need that applies to underserved community individuals who encounter conditions straddling information technology diffusion and the digital divide. While our focus and targeted populations is the Hispanic/Latino community, many of the demographics of this “within population” are inclusive of underserved populations in general. Underserved populations both local and global need improved techniques to better communicate from low-cost mobile technologies. Our research presents a need for communication protocols and practice that target subpopulations who face both the gap in access to the Internet (digital divide) and language barriers (non-native English speakers). Increasing techniques that complement the use of low-cost mobile devices is proposed to begin bridging the information gap. Underserved populations often face additional healthcare needs due to their limited healthcare coverage or lack of coverage overall as one critical need for Internet access.

Future research suggests modifications to the current web-based application with special emphasis on the demographic information and study participants from the targeted subpopulations. This study’s focus is on the processes associated with mobile devices rather than focusing on a specific device. This allows for adaptation of new devices as technologies change. We believe training and practice of syntactic language across mobile devices can empower individuals who are straddling the digital divide. The results of this research should also benefit individuals who communicate globally with individuals who are non-native English speakers.

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