"Understanding the Digital Divide in Southern Africa"

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1. INTRODUCTION
Work investigating the digital divide between developed and developing regions abounds in literature. In most cases the digital divide has been attributed to either lack of technology, or, closely related to that, limited economic resources, which makes the acquisition of the technological infrastructure needed to cross the divide a challenge. Yet some others argue that the presence of technology is not sufficient in itself to help bridge the divide. …….There has been rapid adoption of mobile phones in Africa over the last couple of years. Besides serving as a means of keeping in touch with family, mobile telephony has served as a useful tool for business communication. For example, since traditional computing devices and networks (i.e. desktops, laptops, WiFi, etc) are not readily available, Internet services such as email and the WWW are limited. Hence mobile phones - voice calls and text messaging – are the prevalent means of communicating and collaborating in most places in Africa. Though the challenges faced by collaborating remote workers have been published, many of those investigations have studied collaborative work in technology-rich environments. Such environments are not representative of most places in Africa, which do not have access to computers and high speed Internet access.

In this study, we investigate the communication challenges present in technology-poor environments. By technology-poor environments we refer to domains where mobile phones serve as the prevalent means of personal and business communication.

More specifically we studied communities created around the AIDS orphans in Africa. Although with 10% of the world's population, Sub-Saharan Africa has 82% of the world's AIDS orphans [1]. Community-based orphan care has been advocated as the most effective strategy of dealing with this crisis [2]. The responsibility of providing care – emotional, physical, and otherwise, to these orphans has been borne by communities consisting of extended family members and orphanages. Within each community many members and a constellation of relationships among these members exists. Caregivers, teachers, administrators, government-employed social workers, mobile workers, and office workers are just a few of the many actors in the community. Since many of these actors are geographical distributed, collaborating with the limited mobile technology resources is challenging, yet crucial for community building.

What communication challenges do people face in these environments? How do they resolve these problems? We believe these questions will be relevant in designing appropriate mobile applications that will facilitate effective communication in these environments.

2. RESEARCH SETTING AND METHOD
In this paper, we present the analysis of observations and eleven interviews conducted in two orphanages in Africa. Two of our subjects were orphanage founders; two were orphanage administrators; four were active community leaders engaged in orphan care; two were educators, elementary school teachers; a government official in charge of orphanage registration; and one orphan. Since our subjects played different roles in the community, they provided different perspectives on community-based orphan care and the use of technology.

Six subjects were recruited in Ndola, Zambia; the remaining six in Loskop, South Africa. In one of the interviews, we questioned two subjects at the same time because of logistical reasons. Subjects were not compensated for their time.

We conducted semi-structured interviews that covered general information about subjects, details of information use, attitudes to and use of electronic devices, and prevailing information needs. Each interview was audiotaped and lasted about one hour. In addition to the interviews, we spent some days at an orphanage in South Africa observing the daily routine and directly engaging the orphans and the caregivers.

3. COMMUNICATION GAPS
Our interviews revealed gaps in communication among the participants in the study. These gaps are a result of the nature of mobile communication, the geographical distance between members of the community, and even the difference in culture between them. As a result, we present five different gaps in communication as seen in our interviews: 1) Gap in access to information; 2) Gap in technological expertise and infrastructure; 3) Gap in rhythms and reciprocity; 4) Gap in language and 5) Gap in culture.

3.1 Access to Information

Mobile members of the community often have to collaborate with coworkers in the office using the mobile phones. Documents are the focus in many of these interactions. According to O'Hara et. al [5], these docucentric interactions could be different forms such as making calls to confirm delivery of documents, calls to elaborate on documents, and calls to access remote document. As the coworkers in the office tend to have a higher level of visual access to information documents compared to the mobile professionals, a gap ensues leading to difficulties in communication.

A*: ".....I can't see the spreadsheet, so I can't say this, if I want to understand the financial situation, I'll just text to say "What's up, ..?" "What's the budget?", "Can you do this?", "Do this", whereas … before I can look at the cash flow and the all spreadsheet on the computer and say, "Ok, I can make more decisions." Now I leave more decision making behind....."*

3.2 Technological Expertise/Infrastructure

Another problem experienced is due to the gap in technological expertise between the professionals in the International office and workers in the orphanage.

A: It's just that sometimes if we do it in Excel, for example, that the formulas get mixed up, and next thing they forgot to add something, the columns don't add up…"

3.3 Rhythms and Reciprocity

The awareness of coworkers' temporal rhythm is critical in coordinating work and forming expectations of availability [3]. The geographical distance between members of a community increases the possibility of imbalance in rhythm between members. Furthermore, it makes members less aware of each other's rhythm, thus leading to decreased effectiveness in communication [4].

We discovered that the time difference between one of the orphanages in our study and its International office in the US exposed the difference in rhythm between actors thus making communication more challenging.

A: *"The other thing is because of the time difference, ... They wake up in the morning, it's supper time for me, talking to a host and then I get six questions."*

A: *".....It's more problematic, she's on the east coast now. Because she's only six hours behind and then I'm, when she's out of bed I'm already asleep. And when I wake up, she's already asleep. So we only have, we have a small window of time now."*

Not only did the office workers in the US have a decreased awareness of the rhythm of the worker on the field, they expected the field worker to be always available since their communication was via text messages, and the cell phone, through which these text messages were sent, was always within reach. This lack of awareness of rhythm and unrealistic expectation of availability resulted in an imbalance in reciprocity.

On the one hand the time difference could negatively impact communication between community members, on the other hand it could enable increased communication considering the economic implications of telecommunications. The impact of the time difference is sometimes ameliorated by the fact that connection rates to the Internet are lower in the evening in the orphanages thus making it a perfect time to communicate with the International office, which is about nine hours behind.

F: *"..... as an attempt to save some money, ...Internet connection is structured here ....cell phone is charged by the megabyte, the landline is charged by the minute. And with the landline, the rate goes down significantly after seven o'clock in the evening. So the challenge there is to concentrate all the communication after seven and before I go to sleep."*

3.4 Language

Language accounts for part of the communication gap we encountered. This could be because of either the difference in spoken language or in the ambiguity resulting from the modality used to exchange communication.

B: "*……we have told people that if you have a quarrel with your wife, stop SMSing. ……Don't SMS. Just talk about it. Because if you mention roses, they'll pick up your thorns in the roses..... So I guess what I'm trying to say is that there are some things that tend to be ambiguous…….*"

3.5 Culture

G: *Like L would help me …… as I travel with her ... she'd say, "In our culture you can't do this", "You can't use that name*."

G: *In the West, there is a high level of common knowledge and procedure that I experienced. People know how a meeting should be ....., people know how to listen to each other, moving towards consensus they have managed discourse that facilitates their own common goals.....there is a high level of productivity and facilitates "do something". …… if there's efficiency, efficiency in Africa is a completely different thing. And so….I struggle with people I work on, I'm aware of how different, I have to almost dump all of those practices, expectations, and enter into something that is in my, ..rest in my very inefficient and very recursive, you know go this way and you know come back this way and then it comes back this way and it's constantly understanding that I think I'm being understood.*

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