DESIGNING TECHNOLOGIES TO SUPPORT MIGRANTS AND REFUGEES

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DESIGNING TECHNOLOGIES TO SUPPORT MIGRANTS AND REFUGEES

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DEDICATION

In loving memory of my aunt ***Gloria Davis Benton****,*

my grandparents ***Sydney and Loretta Davis****, and*

my 6th committee member and mentor ***Dr. Gary Marsden****.*

You all started with me on this journey

and have been supportive every step of the way.

I dedicate this milestone to you all.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

Migration is often a strategy undergone to improve the outcomes of families. Many families—whether in pursuit of better economic opportunities or to flee persecution and other challenges of the home country—will resettle in other countries. Whatever the impetus, migration is disruptive to the family unit. In my dissertation I explore two forms of family migration—parental migration (where parents and children live apart) and refugee resettlement (resulting from forced migration). In both forms, families are embedded in support networks of individuals they rely on to minimize vulnerabilities faced post-migration and to rebuild a stable family structure. My empirical results revealed barriers—distance, language, literacy and otherwise— that render the engagement between families and their support network less than effective. Through participatory approaches, I investigated opportunities for improving the engagement between migrants in transition and their support network through scaffolding communication with systems designed for transient use. *I wanted to see the potential of communication scaffolding tools in mitigating communication barriers to engagement—distance, language, literacy and otherwise—in migrant support networks, facilitating parental competence and/or increasing the livelihood strategies of migrants undergoing disruptive life changes.*

To this end I developed two such systems, Rivrjam and Rivrtran. Both were integrated web and Interactive Voice Response (IVR) systems, accessible through a phone call or via a web client. They mediated the exchange of voice and text messages between families and their extended support network. The applications provided the

capabilities for storing, rerouting and (in the case of Rivrtran for refugees) soliciting the translation of messages via volunteer interpreters. As a means of evaluating Rivrjam's effectiveness, I deployed it at a public high school in Jamaica to support transnational home-school communication with migrant parents living in the US and UK. From a case study, I uncovered the potential it had to improve the range of support an already active parent could provide to a child with increased awareness of the child's needs and challenges. The second application Rivrtran, designed to mediate refugee-mentor communication with human-in-the-loop interpretation, was deployed at a refugee-serving agency and utilized by urban refugee families paired with American mentors. I saw the potential of Rivrtran to provide culturally sensitive translations and to empower refugees to request assistance and diversify their livelihood strategies, helping them to achieve livelihood outcomes such as reinstating healthcare or enrolling kids in academic programs.

The end contributions of my work include: i) Contributing a nascent agenda on migration for Human-Computer Interaction (HCI) and related fields through providing an increased understanding of the challenges that limit the livelihoods of migration-separated and refugee families; ii) Demonstrating two communication scaffolding systems for transient use by migrants to mitigate communication barriers—time and distance on one hand (to support transnational home-school communication) and language and literacy on the other (through mediated human-in-the-loop voice translations for everyday interactions with refugees); iii) Putting forth a reflection on methods to guide others seeking to work with similar groups and establishing the notion of *designing for transient use* in the development of systems to scaffold communication.

CHAPTER I

INTRODUCTION

1.1 Motivation

Worldwide, over 250 million people live outside their native country [84]. Migration's push and pull factors are complex and varied. Any combination of economic and political factors, religious persecution and natural disasters, cause migrants to leave their homes. Economic opportunities, freedom and security and visions of a better life draw them to host nations like the United States, which receives the highest number of migrants [5]. Remittances—monies sent home by those who leave—flow back to home countries. For developing countries (which has the largest pool of emigrants), the size of the remittance flow is quite large. Small nations often see contributions that surpass the country's foreign reserves or developmental aid received [84].

A large majority of migrants are families who make the hard decision for some or all of its members to migrate; a strategy to improve livelihood outcomes. But migration is a disruptive event that has a destabilizing effect on families [5]. In my dissertation, I look at two forms of migration, parental migration—which sees parents and children living separately and forced migration through the lens of refugees fleeing poverty, discrimination and political violence. Both groups experience changes to the family dynamics that impedes parental involvement and/or limits livelihood attainment in the new country. This makes the family vulnerable and put children at risk—prone to physical and psychological challenges and academic failure [6],[51],[22]. With a dismantled support structure, these families in transition rely on a network of supporters to minimize their vulnerabilities post-migration. Helping them rebuild livelihoods and/or regain parental capacity is about making the necessary connections

to facilitate engagement between themselves and members—educators, mentors and so on—of the broader family support network. This work contributes a demonstration of how systems designed for transient use to scaffold communication can help to mitigate barriers in diverse migrant support networks, as a step towards helping migrant families recover faster from the vulnerabilities of migration.

These groups of migrants increasingly have access to technologies that could make the necessary connections, but do not sufficiently do so. Typically these technologies require a lot of resources for their functioning—physical (telecommunications, electrical), human (literacy), financial (money to purchase the tools and support their functioning) which may not all be available to new migrants (transnational and refugees alike). They are also not always sensitive to barriers—distance, time, language and so on—that hinder effective communication. This suggests an agenda for the fields of Human-Computer Interaction (HCI) and Computer Supported Cooperative Work (CSCW) in which researchers are concerned with the use of technology to support mediated communication in attempts to overcome limitations—often time and space—and enable collaboration in distributed groups in the domestic and work space. I empirically investigated barriers to engagement between migrant families and their distributed support network and opportunities for enhancing it. I look at how technologies are (if at all) being used to facilitate the necessary connections within the network and where it still remains lacking. My empirical results revealed that both groups—due to barriers (distance, language and so forth) could benefit from computer-mediated communication tools as scaffolding to help build trust relationships in their support networks. As such, I designed and demonstrated two asynchronous message-exchange systems for transient use—one embedded in a transnational environment spanning home and school (Rivrjam) and the other in a refugee resettlement program to provide translation support for new refugees (Rivrtran). In both cases I saw where mediation in this form, had the potential to diversify migrants'

access to help, through empowering them to request it of the right people. Mediation in this form also had the potential to help migrants building trust and social capital. Below, I outline the research questions that guided this investigation.

1.2 Research Questions

A goal of my thesis is to understand and mitigate limitations to communication in distributed support networks for migrant families. I set out to understand how to scaffold communication in two settings with migrants—i) transnational home-school communication in families undergoing parent-child separation due to long-term parental migration, and ii) refugee resettlement mentorship programs with non-English proficient refugees (requiring interpretation). My overall research questions are: *What is the potential of technology in mitigating communication barriers to engagement—distance, language, literacy and otherwise—in migrant support networks. Whether, and if so, to what extent does communication scaffolding (through the use of two communication tools, Rivrjam and Rivrtran) facilitate parental competence and/or increase the livelihood strategies of migrants?* Below I outline separate research questions for each group I investigate while Table 1 summarizes the methods used to tackle the research questions.

1.2.1 Transnational Home-School Communication

Parental migration, often a domestic survival strategy, gives rise to a vulnerable population of children left behind. Despite this, there is an absence of research in HCI, CSCW or related fields that focuses on the needs of this group. My research calls attention to the situation of children left behind, an increasing demographic whose vulnerability and poor development is often masked by their increase in resources and finances remitted to them by migrant parents. In this research, I sought to understand the role of Information and Communications Technologies (ICTs) in supporting parent-child communication and remote parenting. I wanted to broaden my

understanding of family communication within transnationalism and what remains open research challenges as ICTs are taken up into these contexts. Here my research questions were:

- RQ1: What are unique aspects of the parent-child communication in migration-separated families?
- RQ2: How are communication technologies being used to connect distributed caregivers (parents, guardians and teachers alike) and what opportunities exist for enriching information sharing within this network?
- RQ3: Whether, and if so, how does an asynchronous message-exchange platform support transnational parent-school communication and in what ways does it enhance parenting competence (perceptiveness, responsiveness) in migrants separated long-term from children?

Given a number of the challenges this group faces (such as not having face-to-face access to their child's care network) overlaps with those faced by other parents living away long term from children (for reasons such as work or divorce), some of the recommendations could extend more broadly.

1.2.2 Mediated Refugee-Mentor Communication

Refugees, uprooted from their home countries for a number of reasons including fear of persecution, undergo the process of resettlement in a new country. Many face social difficulties with communication and socialization in their interactions with host nationals due to language and cultural differences. Such drastic life changes are stressful for these families. As such, refugee-serving agencies focus specifically on improving family outcomes at both the parent and child level. Family mentorship and literacy programs help parents quickly rebuild livelihoods and to better understand the expectations of them (such as being actively engaged in their children's academic life)

in the new country. Education mentorship is also provided to children of refugees in order to foster positive emotional development and academic success as they integrate into the host country. Effective engagement between mentors and refugee families (especially the heads of households and parents) to communicate goals or challenges is important. This is hindered as many refugees lack fluency in English and live pretty busy lives. In this second study I sought to understand the communication barriers between parents and mentors and the potential role for scaffolding communication through human-in-the-loop interpretation. My main research questions are:

- RQ4: What are the barriers to refugee-mentor communication with urban refugee families?
- RQ5: How can computer-mediated communication and translation attempt to mitigate some of these barriers?
- RQ6: What is the impact of scaffolding the refugee-mentor communication—through the use of Rivrtran, a human-in-the-loop voice translation tool—on the livelihood strategies employed by newcomer refugees? Does this mediation contribute to the (re)building of assets and an increase in livelihood outcomes for newly arrived refugee families?

Table 1: Methods Used To Address Research Questions

	Method	**Research Location**	**Data Gathered**
RQ1	Interviews	USA, Jamaica (remote, in-person),	Recordings
RQ2	Interviews, Design Activities	Jamaica (in-person)	Recordings, drawings
RQ3	Iterative Design, Field Observations, Interviews,	Jamaica (remote, in-person)	Artifacts, field notes Recordings (pre, midway, post),
	Surveys	Online, phone	Pre-test parent and child relationship surveys, child bi-weekly diary surveys (phone)
	System deployment, Log and Content Analysis	Jamaica, US, UK (9-week remote)	Rivrjam messages, system log data
RQ4	Interviews, Participant observation	A southern US state	Recordings, field notes
RQ5	Interviews	A southern US state	Recordings, field notes
RQ6	Interviews, Analysis with Sustainable Livelihood Framework,	A southern US state (Refugee Reception & Placement Agency)	Recordings, reports
	System deployment, Log and Content Analysis	(3 month, in-person)	Rivrtran messages, system log data

1.3 Contributions

In this dissertation, I provide evidence of the research I have completed to tackle the set of research questions around scaffolding communication through the design of transient systems to support migrant groups. I presented insights learned from the multi-country deployment of Rivrjam in the US, UK and Jamaica to support transnational home-school communication and the deployment of Rivrtran to provide human-in-the-loop voice translations for refugees and their mentors. My research contributions are summarized below:

1. In the course of investigating RQ1 and RQ4 through qualitative methods, I contribute a nascent agenda on migration for HCI and CSCW. This includes i) providing an increased understanding of the challenges that limit proper family functioning in two types of migrant families undergoing long-term disruptive life changes—migration-separated and refugee families, and ii) highlighting the barriers that prevent migrants' effective communication with members of their family support network (including educators and mentors) and the negative impact this has on migrant families' livelihood attainment and child development.

2. In addressing RQ2 and RQ5, I explore two distinct yet similar problem spaces through a mix of design activities, contextual inquiry, interviews and participant observations. I i) highlight short-comings in the ways existing technologies have been used in attempts to connect migrant support groups, and ii) emphasize the need for scaffolding communication through technologies that help migrants without creating long-term dependency on the tools or masking barriers uncovered through RQ1 and RQ4.

3. In investigating RQ3 and RQ6, through semester long deployments and evaluations, I have i) demonstrated two communication scaffolding systems for transient use, to mitigate communication barriers—time and distance on one hand

(to support transnational home-school communication) and language and literacy on the other (through mediated human-in-the-loop voice translations for everyday interactions with refugees), and ii) put forth a reflection on methods and the notion of emphdesigning for transient use to guide others seeking to work in similar spaces or with similar migrant groups.

1.4 Overview of Dissertation

I begin the dissertation by highlighting related work in Chapter 2 to motivate the study. In Chapters 3 and 4, I discuss the formative study conducted with migrant families and children left behind, which led to design implications for the development of a tool to mediate parent-school communication at a distance. Following that, I discuss the development and evaluation of the resulting tool Rivrjam in Chapter 5. In Chapter 6, I outline the formative work with refugee families and their mentors and the second system, Rivrtran, which came out of this work. Chapter 7 then outlines the results of the deployment. The final, Chapter 8, outlines limitations of the study, presents a reflection on methods and further discussion on designing for transient use.

CHAPTER II

RELATED WORK

To set the context, in this chapter I begin with background information on two forms of migration—parental migration and refugee resettlement. Whether resulting from economic and/or political conditions, such disruptive life changes modifies the family dynamics. I discuss the similarities these migrant groups face—a disrupted family unit that leaves its members vulnerable and put children at risk of poor development. This vulnerability motivates the need for tools that can support parental engagement and help families rebuild their livelihoods and support network post migration. I discuss literature around tools available to groups facing distance, language and literacy barriers. I highlight the technical aspects of mediating communication, outlining work done around Computer-Mediated Communication (CMC) in the workplace, Interactive Voice Response (IVR) technologies, translation systems and systems to support home-school communication.

2.1 Migration as a Disruptive Life Change

As of 2015, an estimated 250 million (over 3 percent) of the world's population lived outside their native countries [84]. On the economic side, migration is seen as a 'domestic survival strategy' [19]. It allows families residing in 'limited national spaces'—countries with few opportunities for economic progression—to augment their livelihood by seeking opportunities abroad [73]. For others, like refugees, forced migration is often the result of fleeing persecution, discrimination, political violence or natural disaster in one's home country [41]. The United States, the largest recipient of immigrants worldwide, attracts 20 percent of the world's migrants [87]. In 2013 it granted just under 500,000 newcomers lawful permanent residence status [54]. And in 2014

alone, nearly 70,000 refugees arrived in the US with many seeking asylum [4]. In all, 13 percent (41.3 million) of the US population as of 2013 were immigrants [87].

Migration has its benefits. With its flow of people, migration brings remittances to countries—money sent from overseas by migrant family members. In 2014, remittances sent to developing countries tripled the amount of foreign aid issued by governments and is projected to rise to $479 billion by 2017 [84]. In addition it provides a safe haven for those fleeing human rights abuse and natural disasters in their own home country. The result is better health, education, clothing and nutrition for the households who benefit from increased income and/or the opportunity to rebuild life [19]. Yet, regardless of choice or forced migration, both experiences change the family dynamics in a way that impedes parental involvement and/or limits livelihood attainment which I discuss next. This causes families to rely on a network of supporters to minimize their vulnerabilities.

2.1.1 Migration's Impact on Family Life and Parenting

Effective parenting requires *knowledge* of how a child's needs can be met, the *motivation* to do so, *resources*—both material and personal—to execute and the *opportunity* in terms of time and space [82]. Yet long-term disruptive life changes such as parental and forced migration can impede a parent's perceptiveness and access to resources. Limited resources stem from starting over in a new country which requires reestablishing one's life and livelihood. As a result, making adjustments and responding appropriately to a child's needs may not occur on the part of the parent. There are challenges unique too to the different family situations.

With parental migration, the distance hinders frequent physical interactions and visits which are essential to building trust relationships [42]. Children feel abandoned and may begin to detach from parents. And due to existing societal expectations of mothers as caregivers, the gendered effects of migration cannot be ignored. With

absent mothers, children left behind are more prone to engage in violence [19]. Their risk of being physically or sexually abused is also heightened. Long-term, the resulting separation strains and even changes the nature of the parent-child relationship. When exploring parental migration, I focused especially on families with adolescents. Parental involvement is especially crucial during adolescence to help teens tackle emotional and identity challenges brought about by their new family situation. Moreover the parent-teen relationship is already prone to conflict and diminished closeness as a natural part of a child's transition to adulthood [45]. Coupled with the separation, this puts the relationship even more at risk.

Much like migrants, refugees face changes in lifestyle which bring about new family dynamics due to movement from one country to another. Limited English-language proficiency is one of the greatest stressors reported by non-English speaking refugees in the US [29]. They attribute their lower language skills to misdiagnosis by health workers, missed employment opportunities and an inability to garner social support by forming bonds with Americans [29]. As such, there are social readjustment agencies set up to help these individuals during the transition to becoming self-sufficient and independent. Many of these agencies cater to refugee children in particular, given the high rates in which they too arrive to new countries. For instance, a quarter of all new refugees in the UK are children [22]. Moreover, their status as refugee children makes them high risk. This is because refugee children oftentimes experience forced displacement and violence which puts them at risk for psychological disturbance [22]. Post-traumatic stress disorder, depression, conduct disorders and anxiety are common symptoms they experience [22] much like children left behind [6]. There are also unique environmental factors that make them vulnerable such as poverty, immigrant status, cultural isolation, displacement, access to healthcare and the number of times they have to make living transitions[22]. Such risk factors seem to increase rather than diminish the longer families reside in the host country.

From this it is clear that minimizing vulnerabilities for families, especially children is necessary. This dissertation focuses on steps to do so. This involves keeping parents engaged in the life of children as this impacts a child's development and academic success [66] and helping families rebuild lives and livelihoods in the new country. This involves connecting the broader family support network and helping individuals overcome the barriers to communication that they face. Next I discuss systems designed to overcome distance and time barriers to connect distributed families or transnational groups and to coordinate work. This will identify gaps which need to be addressed when designing tools for these migrant groups, especially for supporting remote parenting.

2.1.2 Designing Technologies to Support Migrants

Designing technologies for migrants is a nascent research area. But with millions living outside their home country, understanding how best to support newcomers in a country on arrival and long term is important. Researchers have begun to examine the complexity of migration from different angles—health, social, socioeconomic, education and so on. Not included in the heart of this study is previous work I have done on designing with immigrant women to tackle their health and wellness challenges post-migration [8]. This work was important given women comprise nearly one-half of the immigrant population worldwide and are susceptible to a wider range of health challenges compared to immigrant men. The study included participatory design sessions with immigrant women from the Caribbean to identify health and wellness challenges they faced and to conceptualize technologies to help them manage these issues. The focal design themes identified by the women were stress, dietary challenges (e.g. obesity), mental health, and domestic abuse. Their design approaches spanned wearables to control diet and portions when eating, to ambient technologies to support mood awareness to combat depression and a host of other ideas. Overall

the designed emphasized *rebuilding the support structure* for migrants which is often disrupted post-migration, *reducing stressors through entertainment and relaxation* to support mental wellness given the many stressors migrating brings about and *encouraging positive gradational lifestyle changes* in a way that doesn't impose assumptions about health practices on women without accounting for culture. Finally, this work showed how the technologies conceived by these women supported rather than replaced social solutions to the health and wellness challenges faced by these and other immigrant women. These are principles that are reflected in my current work too, to look at ways to integrate new technologies with existing social solutions rather than replacing them.

Other researchers have designed with and for the migrant community. Teen Design Days is a research methodology incorporating design thinking [23]. It has been conducted with immigrant and refugee youth to help them explore ways ICTs can be used to enhance their roles as information mediaries—helping others in their community (elders, non-English speakers) through technologies (e.g. to gain access to information) [23]. And Speakeasy, is an integrated web and telephone service which helps help immigrants foster community and get access to resources through multilingual guides in their community [31]. These design initiatives all reflect the important role of technologies in providing access to information, connecting communities, encouraging civic engagement and positive health behaviors among the vulnerable immigrant population. Finally, the design of interactive systems in the field of HCI has always been about automating processes and making interactions seamless and invisible to the user [80]. The idea of 'inconvenient interactions' is however coming into the foreground in areas such as health support where motivating, encouraging or explicitly engaging users in interactions (rather than performing actions for them) is useful to provide long term benefits [64],[76]. One example of a meaningful inconvenient interactive interface is the HappinessCounter which promotes smiling based on

the Facial Feedback Hypothesis. This hypothesis purports that smiling can induce a more positive mental state in the person smiling. Smile recognition software was embedded in devices such as refrigerators, alarm clocks and so on, requiring the user to smile before these devices can be opened or turned off [76]. The Inconvenient Microwave requires a user to perform step aerobics for the duration the user requires the microwave to operate, the goal being for the user to burn calories before consuming calories [64]. These systems are not merely inconvenient due to bad design but a 'meaningful inconvenience' that provides benefit to users eventually though not necessarily immediately. Such principles may be useful when designing tools for migrants in efforts to help them overcome rather than mask barriers. It is important to note that such approaches are value-laden, imposing on users notions of what is and is not healthy. Thus value-sensitive design which is based on the premise that the tools we build are embedded with values could help to account for them in the design of systems [24].

2.2 Tools to Overcome Time and Distance Barriers

2.2.1 Distributed Family Communication Tools

A number of research studies have explored how computer-mediated communication technologies have been used to mitigate limitations such as distance to support richer forms of distributed or transnational family communication. In HCI and CSCW, research centered around facilitating awareness in distributed families includes family awareness tools [7],[11],[36],[55], [67] and systems for parent-child interaction [53],[86]. To keep distributed families connected at a distance (and the larger extended family), a variety of family awareness tools have been designed [7],[11],[36],[55],[67]. Digital Family Portrait was a system that utilized digital frames as a surrogate support system to connect families with elderly members, living apart [55]. It visualized the daily activities of aging adults, to their family members who lived remotely, as a means

of prolonging their independent living while easing tension for their family caregivers [55]. In another example, the Whereabouts clock displayed location information of family members so they could know where each other were at any given time [7]. Quite a number of family awareness systems are intentionally asynchronous. VideoProbe and Hermes@Home were built to suggest and share text and picture messages between households [36],[67]. Users of such systems reported positive benefits of 'opportunistic' messaging—being able to send a note in the moment it is conceived. Additionally, such systems supported awareness of distant households or family members living away and often served as a first point of contact to initiate communication, which was then followed up, if necessary, by telephone or email. Such tools allowed for more forms of expressions through non-text comments such as hearts and smileys [53]. Other systems work by visualizing daily aspects of family life. The common thread with all the systems was the importance of technology to provide connectedness (in spite of the distance) or awareness and coordination whether in or between households.

While both family awareness tools and systems for parent-child interaction suggest the potential for family connections, they have limitations when used in the context of a family support networks. For instance, from my research I find that 'opportunistic' messaging which the VideoProbe and Hermes@Home provided, is necessary in the refugee-mentor relationship. Yet tools that exist, do not provide asynchronous opportunistic messaging with translation support to overcome the language barriers—a gap my research fills. Additionally, tools designed for distributed family communication may not suitably transcend a domestic and work environment. They are not specifically designed to include non-family supporters such as educators or volunteer mentors, who interact frequently with children as part of their duties. There are other limitations too. These sort of systems are not suitable for the types of 'irregular' infrastructure and access encountered in some countries and/or contexts by transnational and refugee families. For instance, though Information and Communication

Technologies (ICTs) and the Internet make increased inroads in places like Jamaica, it is still also the case that people are more likely to have sporadic Internet use. And refugee families, while undergoing transition may not have permanent infrastructure at home. As such, families make use of devices located in other people's homes, the public library, Internet cafe or even the workplace that can make the connection. Designs that presume regular and synchronous access may miss out on opportunities to connect the family support network as a result. Instead, designs that assume and accommodate an imbalance of technologies, access points and locations of their usage are essential. So too are designs that push our thinking. For instance tools that shift from an assumption of collocation and kinship in the definition of family are needed to support transnational communication in migration-separated families. In the interim, the mobile phone, discussed next, continues to be the go to for transnational families despite some limitations.

2.2.2 Mobile Phones

Within transnational families, the mobile phone plays a critical role. Transnationalism—the study of flows of people, objects, ideas and so forth that cross boundaries such as nation states—has gained currency within ubiquitous computing (Ubicomp) and related fields [12],[69],[78],[83]. Ubiquitous communication technologies which overcome geographical distance have been increasingly adopted into homes to connect distant families and support 'away' parenting. Within that, a focus on migrants has developed because they open up new technology contexts due to their ICT usage patterns and have different orientation to concepts that can push our design thinking [83]. For example, Williams et al. [83] described how people considered several physically-distributed places as a 'single domestic sphere' based on a network of kinship and exchange. A number of these studies locate the mobile phone as a technology that supports transnationalism, particularly of migrants, although not without difficulties

that crossing different infrastructures can sometimes create [83]. We see examples of how the ubiquity of cheap pre-paid plans (often targeted at connectivity between the home nation and common places of emigration) supports the distributed home [33],[79]. In a study of El Salvadorian transnationals, Vertovec found that cheap calls facilitated the 'everyday discussions' non-distributed families have when gathered together in periods such as during mealtime [79]. He argued that those calls supported role maintenance (e.g. parenting), encouraged joint decision making, and thus allowed distributed families to "still retain its sense of collectivity" [79]. However, Vertovec also found that while telephone calls assuage the emotional anxiety surrounding long-distance separation, they can also increase tension and create problems such as anxiety or addictive behavior (also reported in [58]). Similarly, a study on Filipina migrant mothers and their left-behind children found contrasting views towards the use of mobile phones for supporting connections [47]. Filipina mothers who could afford to initiate the calls on their end, felt able to parent from a distance. Left-behind children on the other hand, who could not afford to initiate the calls, were ambivalent about the benefits of mobile phones as it made it too convenient for mothers to be mothers, i.e. monitoring their child's activities and calling at inopportune times. Additionally, children did not associate frequency of calls with increased parental connectedness given the cost structure of the phone (which at the time made it unaffordable for them to initiate calls) did not allow them to feel like they could contribute towards building a relationship on their own terms [47]. Frequent calls from parents abroad seemed more like surveillance to the children who received them [33]. Moreover, in only connecting to children, parents limit their perceptiveness, as they miss out on communicating with others who could provide information about a child's needs and well-being. In my study, I've seen how a reversal of the cost structure made phone calls by children from Jamaica to parents abroad cheaper for the family than the reverse. This enabled children to now initiate calls on their own

terms, improving their perception of the benefits of the mobile phone. They could initiate calls after chores were completed or in the moment they had a need [9]. So while mobile phones would appear to have the ubiquity and consequently the potential for ameliorating the risks associated with migration, the research to date, suggests a mixed picture [47]. Despite this, one thing is certain, parental engagement during separation is important for the proper development of the child.

We also see the role of the mobile phone in increasing families' livelihood strategies. In a series of studies, Horst and Miller [33],[32],[52] describe the significance of mobile telephony in the lives of low-income Jamaicans. For example, they find that a significant percentage of low-income Jamaicans depend on remittances from abroad. The mobile telephony allowed people to request particular help from family and friends overseas and facilitated the microcoordination necessary to transmit the funds. Despite the positives, Horst highlights how the technology was a 'blessing' to those who used it to maintain support networks important for the receipt of assistance, while a 'burden' at times to the recipients of these requests for support. I now shift from the domestic, into the public and work space to explain how computer-mediated communication tools have been used there to overcome time and distance limitations.

2.2.3 Workplace Computer-Meditated Communication Tools

Computer-mediated systems were originally conceived to connect members in the work and public space. People who were distributed and even time-shifted still needed ways to coordinate and collaborate at a distance. In Computer Supported Cooperative Work (CSCW) research, we find many examples of technologies being built to support collaboration—whether synchronous or asynchronous [63]. This has been looked at largely in the workplace or for distributed work activities even among collocated groups. Given part of the family support network seeps into the work space,

(connecting with teachers or refugee staff members) it is important to highlight research around how this occurs in that space.

One such tool supports asynchronous collaborative writing through in-situ annotations [81]. This design shifts beyond static annotations, to provide rich annotations which allow for in-situ discussion and that includes context and revision history such as whether an annotation was incorporated into a document [81]. Research that explores asynchronous video collaboration include Time Travel Proxy, an attempt to support time-shifted meetings by embedding the social context into video recordings [71]. A person who is unable to attend a meeting, pre-records their contributions which are then played via a table which serves as a physical proxy. Responses and reactions by others to that person's comments are then recorded and made available to the absent individual. These technologies, allow for more interactive engagement and provides the sense that the missing person is there. They however require much effort to review and record. Moreover, it requires advanced recording equipment which, while affordable for the workplace, may not be available in-home or in resource constrained workplaces such as schools and non-profit agencies. In the health space, there has been use of systems to support distributed collaborations between in-home health workers and remote expert clinicians to improve the delivery of home care services [46]. One such application provides asynchronous telehealth interactions (which often supplements synchronous forms in a hybrid manner) through rich media data such as recorded annotations of patient records or a patient's image which is then shared with the remote clinician for later review when not available for real-time interactions [46]. This system however requires use of a tablet with the application installed, not allowing for more flexibility with choice of device on the user's part [46].

A functioning parent-child bond heavily influences a child's positive academic outcome into adolescence and parents involved in school gain the necessary social resources to promote academic achievement [18]. Computer mediated communication

tools can also provide some support for this group as I discuss next.

2.2.4 Systems for Home-School Communication

In light of the importance of parental engagement in the academic life of a child, education researchers have looked at ways to support parent-school communication [62],[77]. Tools to connect home and school include online portals set up by commercial education vendors which allows for a child's grades and assignments to be shared and connects parents to teachers [62]. For instance Edmodo, an online social network to enhance student engagement in the classroom, also includes functionality for teachers to make the progress of students visible to parents [21]. I speculate however, that the technology behind such tools as a result of 'media richness', will likely need to be accessed form a standard web browser on a laptop or desktop computer, ignoring the pervasiveness of mobile technologies. We also see the use of voicemail technologies to exchange messages between parents and teachers who call into the system [77]. These tools however were designed with the expectation that some in-person follow-ups can take place, though this is not the case for migrant parents who infrequently make the trip home. Or even for refugee parents who are often too busy with work to visit and/or face language barriers that prevent private communication with a mentor. Largely due to the limitations of existing translation options, they often need to rely on translations from friends, family or their children. I next discuss some existing translation options utilized to mitigate language barriers and their limitations of use.

2.3 Tools to Overcome Language and Literacy Barriers

2.3.1 Translation Tools

There are a number of options available for translation. I classify these into quadrants based on the synchroneity of the translations—*synchronous* (real-time) or *asynchronous* (pre-recorded, documented), and the formality of the translation provided—*formal* (done by a trained professional, use of formal language) or *informal* (not

requiring professional training, use of dialects or deviation from formal language). In the formal-synchronous quadrant is found professional language help lines (e.g. AT&T Language Line). Such services are often used by schools, hospitals and emergency departments needing to provide real-time over-the-phone translation support for those they serve. In the formal-asynchronous space is found document translation services. It is useful for providing professional translation of written documents. Professional interpreters straddle the line providing both synchronous and asynchronous translation in the formal space. While both formal-synchronous/asynchronous tools are useful for sourcing professional translation, accessing these services tend to be expensive and support for lesser known languages may not be available. Formal-synchronous/asynchronous tools are also not ideal for opportunistic messaging or for supporting short everyday conversations such as inquiries into one's day. Moreover, some refugees may not fully understand the formal form of their language, speaking instead dialect variations. Informal-synchronous translation can be provided by computer translation applications (e.g. Google Translate) though with great inaccuracies for long sentences. And friends and family straddle the line providing both synchronous and asynchronous translation in the informal space. While the added benefit of family and friends providing translation support is that they can provide not just translation but cultural interpretation, at times the familiarity makes this option less ideal when more private communication is needed. Hence an open gap exists in the informal-asynchronous space which this research seeks to fill for non-English speaking migrants.

Along with language barriers, many migrants, especially those whose educations were disrupted due to forced migration or poor economic situations in their home country, face literacy barriers even in their own language. Systems that can leverage voice in interfacing with users such as through IVR technology, will make an application more accessible to those with literacy limitations. I discuss examples of related

work on IVR applications.

2.3.2 Interactive Voice Response (IVR) Applications

Interactive Voice Response (IVR) systems provide automated voice services over telephone while capturing a user's input via the phone's keypad [40]. Though this technology has been around for sometime, it is a popular method for building applications for marginalized groups in resource constrained regions given interactions over voice overcome barriers such as illiteracy and given the pervasiveness of mobile phones even among the poor is accessible to underserved populations. As such, platforms like the Spoken Web were created to make it easier to build IVR systems by non programmers [40]. IVR applications for research in developing countries have been built for a variety of purposes including community radios, help lines, information portals, voting platforms and social forums. PhonePeti is an automated answering machine for a community radio station in India which seeks to improve community engagement among a low-literate population [39]. Voice based social media solutions include Avaaj Otalo, an interactive voice application for farmers in Gujarat, India [61]. The platform was used as a forum for asking and answering questions about various agricultural topics. There are also use cases in the health arena. Pai et al. show the potential of automated voice calls to promote adherence to medication by pregnant mothers in India who were sent weekly reminders to take their iron supplements [56]. Even in underserved communities in the developed world the benefits of IVR technology has been seen. EatWell is one such example where an IVR system is used to coordinate advice on eating healthfully within an underserved community in the US [27]. They found the use of voice allowed rich emotions to be conveyed along with messages that reflected on people's eating practices. There are challenges however with using IVR platforms to develop voice-based social media—the difficulties

with supporting threaded conversations, indexing and searching content and managing identity[60]. As such, I sought to mitigate those challenges by supplementing the voice-based platform with a web client, which parents and teachers alike could access.

2.4 Conclusion

Disruptive life changes thrust families into new care dynamics. We looked at two such examples—parental migration and refugee resettlement and the impact it has on family life and parenting and how tools have been used in attempts to normalize family life. Communication tools need to connect families with their support network in spite of distance, access, language or literacy barriers. We saw how existing tools helped or fell short. This then opens up the need for the design of appropriate tools to help families rebuild their livelihoods post migration and to better engage migrant and refugee parents in the academic life and the general well-being of their children. For instance, tools should take into consideration the unique situation and needs of migrant parents (like not assuming co-presence) and refugee parents (with literacy and language barriers) and extend to include members of the family support network network such as teachers, education mentors and local guardians. In the next chapter, I shift to a discussion of how transnational Jamaican families in my research utilized available technologies and new media to parent and communicate at a distance.

CHAPTER III

CHALLENGES OF MIGRATION FOR TRANSNATIONAL FAMILIES

I begin with an exploration into one form of migration, parental migration. Through the lens of this group I contribute an exploration of how technologies can be designed to support challenges of family separation. With many migrant families living a part, this study shows one attempt to mitigate the distance and time barriers faced, and the limitations thereof through use of an asynchronous message-exchange platform to support transnational home-school communication.

Modern migration is characterized by who leaves and increasingly for many families that is the nurturing parent. An absence of one or both parents gives rise to "transnational parenting" or "teleparenting" [13],[44]. This refers to the growing phenomenon of parents living and parenting at a distance in a country other than the one in which their children reside. In 2011 about twenty-five percent of children in some migrant-sending countries were separated for periods of time from one or both parents who resided abroad [50]. These periods take three primary forms [38]—seasonal migration (temporary separation such as limited-term work abroad programs), serial migration (transitional migration with the intent of parent-child reunification in the host country) and prolonged migration (indefinite migration with no intent of parent-child reunification in the host country). In this chapter, I discuss the results of an exploratory study to understand how parent-child communication occurred during parental migration in Jamaican families. First I give a background of migration on the island and why it is a suitable location for exploring transnational family communication. I then discuss the specifics of the two-phase study done in the

United States and Jamaica. I sought to uncover unique aspects of family communication for this group and understand how parents and children were utilizing existing technologies to maintain connections at a distance. I discuss guardianship and caregiving for children left behind, the use of technologies (in particular the mobile phone) to reconstitute parental roles and authority at a distance and the limitations thereof. One main challenge I uncovered was how difficult it was for migrant parents to communicate with the broader care network of their children (including educators), left in the home country. This network often expanded post-migration.

3.1 Migration in Jamaica

In Chapter 2, I broadly discussed parental migration and its impact on family life and children left behind. Here I discuss additional research on migration as it relates to Jamaica in particular. We picked Jamaica as it has been a representative field site of this phenomenon for decades. In the 1960s, as many as 98 percent of children of Jamaican emigrants to Britain did not migrate at the same time with parents [70]. And in 2010, some three-quarter of households in inner-city communities in its capital had a child left behind by one or both parents who relocated abroad [30]. Children left in the home country often receive money as well as corrugated cardboard barrels of goods, food items and the latest technologies from their parents abroad in lieu of their presence [6]. The receipt of these barrels is so widespread that those who get them are termed 'barrel children' [14]. Though migration has its benefits to the island—foreign remittances (i.e. monies sent home) exceed Jamaica's foreign reserves [84] and accounts for nearly one-fifth of it's Gross National Income (GNI) [19]—children left behind are more likely to suffer psychological distress and be vulnerable to abuse, violence and exploitation [1]. Such factors impede proper child development. Feelings that arise from being detached from a parent could lead children to engage in risky behaviors and/or affect their academic outcomes [50]. Smith et al. in their work with

Caribbean immigrants in Toronto who were undergoing serial migration, found that children who endured longer periods of separation (and those who were adolescents when that happened), during reunification experienced lower self-esteem, conformed less to parental authority and identified less with the migrant parent [70]. Truancy—skipping school without proper reason—as they found, was the most frequent deviant behavior exhibited by these children [70]. Even in the presence of surrogate care by guardians, migrant parents need to retain parental competence. Understanding the importance of this, some migrant parents have been seen to manage families while away for extended periods of time. They experience varying levels of 'success' through phone calls, emails, text messaging, social media and/or video conferencing [9] [44],[48]. Being able to parent now means being able to effectively communicate and collaborate with members of an extended care network of surrogate caregivers. As I found, this could include guardians, relatives and even educators who often assume care roles [9]. The challenge however remains difficult. Limitations of these technologies to help migrant parents assume their roles while abroad are seen. These include time and space (due to the distance), cost, accessibility and the types of communication they do or do not enable and with whom.

In this study, I set out to understand whether technologies adopted by transnational families to communicate at a distance created or closed gaps during long-term separation due to migration. Specifically, how were technologies being used by families during migration? Do they attempt to mitigate the risks to children left behind, and if so, how? To answer these questions, I conducted a two-phase empirical study with 27 participants. Phase one was done with 8 Jamaicans living in the United States and phase two with 19 participants living in Jamaica. Phase one consisted of interviews only. In phase two, I conducted both interviews and a design exercise given I wanted to know whether other means of communications might be possible, and might not have some of the limitations of phones. In this chapter, I discuss the

research methods and report the results of the data collected from the interviews which shed light on the experiences of these families (captured in [9]). In Chapter 4, I discuss the results of the design exercise (captured in [10]).

3.2 Methods

Table 2: Study 1: Summary of Methods (Spring-Summer 2011)

Phase	**Location**	**Num of participants**	**Methods**
Phase 1	USA (various urban cities)	8 (migrant parents, adults left-behind as teens)	In-person and remote interviews
Phase 2	Jamaica (large urban parish, small rural town)	19 (left-behind children, guardians, educators)	In-person interviews, design activities

The research took place in two phases and at multiple sites in two countries—the United States and Jamaica (see Table 2). Being a migrant from Jamaica gave me quick access to a network of former peers who provided a study site and/or helped with recruitment. I describe the specifics of the methods employed in this section. In Chapter 8 I then reflect on some of the challenges of doing multi-country research.

3.2.1 Phase 1 - Methods

As stated in Chapter 2, I focused primarily on families who underwent parental separation with adolescent children. Given the transition to adulthood is a child's most formative years, separation at this stage in life poses even more challenges to an often already strained parent-teen relationship [45]. In this phase of the study I interviewed a combination of eight migrant parents (who had left behind children in Jamaica) and

adults (who as adolescents experienced parental migration). Interviewing these individuals gave me an initial understanding of the migration experience and its impact on parenting and parent-child connectedness before taking the research to Jamaica. I conducted both in-person and remote interviews based on the participant's proximity to my location. Remote interviews were conducted via Skype (voice or video calls) and Google voice calls. Participants were asked to reflect on their experiences and discuss how they used technologies during the separation and the limitations thereof. From the first phase of the study I learned of the difficulties parents had in retaining parental role even with daily phone calls home (discussed in Section 3.4). Most notably, apart from the child's collocated guardian, migrant parents found it difficult to connect with the people that mattered, such as educators. As a result of this initial finding and to also include the accounts of current left-behind children, I decided to expand the research to include teens, guardians and teachers living in Jamaica as outlined in the next section.

3.2.2 Phase 2 - Methods

In the second phase of the study I probed into ways these groups imagined communication technologies playing a better role in connecting the transnational support network. I wanted to also understand their context of use as well as the challenges and opportunities that came along with that. Recruitment yielded 19 participants who engaged in interviews and short design activities which allowed them to visually articulate their ideas. Participants were recruited from two of the 14 parishes in Jamaica. (A parish is a political subdivisions equivalent to US counties or parishes in Louisiana State). One field site was an urban city (population under 100,000) in a parish on the North Coast. The other field site was a rural but populous town (population 60,000) in a parish along the south-central coast that stood as an urban center in that parish. Both locales exhibited similar infrastructure—the pervasiveness

of mobile phones, the availability of internet at schools, public libraries and internet cafes. Electricity was also available. Broadband internet could be purchased if one desired to obtain the service offered at competitive prices. Many of the participants had internet at home or had had it at some point. The availability or not, often fluctuated with the receipt (or not) of remittance to cover its functioning. Others accessed the internet at local libraries or internet cafes. Students had access too to the internet at school once classes were out.

Participant	Gender	Age Now	Age when left	Mother Abroad	Father Abroad	Country of Residence	Migration Type	Guardian
1	Male	18	17	Yes		USA	Seasonal	Aunt
2	Female	15	10	Yes		Canada	Temporary (indefinite)	Dad
3	Male	13-17	3		Yes	USA	Serial	Grandma
4	Male	15	13	Yes		USA	Serial	
5	Male	14	7		Yes	Cayman	Parental	Family Friend
6	Female	18	15	Yes	Yes	Mom-Canada Dad-USA	Mom-Temporary (indefinite) Dad-Serial	Sister
7	Male	16	6	Yes		Denmark	Parental to Serial	Dad/Grandma
8	Female	18	14		Yes	USA	Serial	Mom

Figure 1: Participant Children Left Behind

Altogether eight current left-behind teens (see Figure 1), three guardians of three of the enrolled teens and eight educators participated in phase two. The children were between then ages of 13 and 18 and attended local high schools in the area. Despite their locale (whether living in a city or in an urban town) their status as 'barrel children' (recipients of goods from abroad), often meant their socioeconomic status was elevated in contrast to others in the same area. This also meant our teen participants in both field sites, urban and rural, were similar. They owned mobile phones and at times other devices such as laptops, tablets and smartphones. Most had parents who migrated to the US, UK, Canada or inter-Caribbean. The period

of parent-child separation for participants ranged from two to over ten years. Some saw their parent(s) at least once a year, while others had not seen their parent(s) since the parent(s) migrated. Most communicated on a regular basis with parent(s). Almost all children were uncertain of whether they were going to migrate or not, or when the parent would return if at all. The guardians I interviewed were all women in moderate-income households and included a young working mother and two older retirees—one a grandmother and the other a non-kin family friend. While the mother had moderate technology use, the older women were not technologically savvy though capable of making simple phone calls on their mobile phones. Despite this, they were able to use tools such as email and video chat with the assistance of others in the household, often the child. Educators I interviewed were a mix of young adult and middle aged men and women working at public and private high schools, in one of the two field sites. Some worked at the same schools as those attended by the child participants. The educators included five teachers, one Dean of discipline (a recent position instituted to oversee student adherence to school rules and authority), one Vice-Principal and one person in a dual Dean of discipline/Vice Principal role. All teachers owned a mobile phone (most a smart phone), knew how to operate a computer and had access to the internet whether at home, in the staff room, or on their mobile phone.

Interview sessions were held at locations convenient for the participants and were completed on an individual basis. This included local libraries, schools, churches, outdoor courtyards as well as the researcher's base within the community. With child participants, I switched between the use of English and Jamaican English creole (locally called patois) as it helped to balance the power dynamics of the interviewer-interviewee relationship by promoting comfort and confidence and encouraging more familial discussions with children. With teachers however, I chose to use Jamaican

Standard English since this served as a marker of respect for their positions as educators. This illustrates the divergence between Jamaican youth who accept 'patois' as appropriate forms of expressions versus older Jamaicans who attribute the use of the dialect in 'formal' situations to the sociology-economically disadvantaged and inadequately educated population [34]. The questions for left-behind children and migrant parents focused mainly on understanding the experiences of these individuals during the separation, and their use of technologies. For those who reunited in the US post-migration, I asked them to reflect on the parent-child reunification experience. I asked teachers and guardians to discuss how information concerning the child was conveyed to migrant parents. Questions also focused on the use of and difficulties with different technologies for communicating with parents abroad or with children back home. For parents, I focused on their experience with remote parenting. I also received insight into this from the accounts of left-behind children, guardians and teachers. The design activity followed the interview. Participants were asked to draw (though some felt more comfortable writing) their vision for how a social application could be designed to help connect the distributed network of parents, educators, guardians and children, in which they were embedded.

For the analysis stage, all interviews were transcribed. I, along with another researcher then analyzed the interview data and resulting designs for thematic connections following an inductive data-driven approach [72]. We identified low-level codes which were then grouped into high-level codes such as 'perceptions of authenticity'. The most important themes that arose are presented in the findings. The findings, highlighted next, begin with a description of parental migration as encountered and/or experienced by participants in the Jamaican context. I mix descriptions of the affects of migration and migrating on participants to contextualize the role that communications plays. I also discuss how communications technologies are used and not used to manage the affects of migration.

3.3 Guardianship and Caregiving Post Parental Migration

Our interviews with participants captured an important aspect of the Jamaican-migration context—guardianship and caregiving. This is important for understanding the subsequent question around technology use and the motivations for the resulting designs. In my research we saw how the responsibility for left-behind children was spread among people. We found different care arrangements that stemmed from whether the child lived with a parent, a relative guardian, non-relative guardian or alone. The care arrangement, as we discovered, influenced the role and capabilities of the migrant parent. Their ability to assume authoritative roles and their consequent use of communication technologies were implicated by the dynamics of the parent-guardian relationship. In arrangements where one parent migrated while the other parent remained with the child, the collocated parent usually assumed the primary childcare responsibilities and/or hired domestic help. In this care arrangement, information concerning the child was relayed to the migrant parent 'at will' by the collocated parent. And often the migrant parent 'at will' assumed or not some of the (non-financial) caregiving responsibilities while away. In another care arrangement, the child is left with a relative or non-parent guardian. The guardian acts as a middle man relaying information between the parent(s) abroad and other individuals in the care network of the child such as educators. The mobile phone in this arrangement was the primary means of relaying information. The guardian also acted as a 'bridge', reinforcing any requests or disciplinary actions meted out by the parent abroad. Lastly, some arrangements led to 'parentification'. A child lived alone or with other non-adult siblings the eldest of whom assumed the role of parent for all. In this case, communication, done primarily via mobile phones was important as it allowed the parent abroad to assume some parental authority, albeit mediated by technology.

3.4 Results

I next discuss the ways I found ICTs were being used by these migration-separated families in 2011 when the study took place. The results highlight how technologies, particularly the mobile phone, were used to provide ubiquitous availability, negotiate control at a distance, create a heightened sense of connection (or alienation) and provide a perception of authenticity as one could use it in attempts to 'find the truth'. As it turns out, daily use of the mobile phone or land-line dominated the parent-child and parent-caregiver communication. Though we looked for other cases of technology or social media being used, we found use of these to be periodic. For instance, email was used for official business, to send important documents such as report cards or paperwork needed for the migration process. For the few parent-child couples that had each other as contacts on social networks like Facebook, the platform facilitated opportunistic sharing (sharing in the moment). It was used to passively view photos of each other and exchange funny videos found online. This habit of mutual sharing seemed to increase the child's thoughts about his or her parent. The use of text messaging was often limited to urgent messages or requests to 'please call me'. A few instances of video chat use were reported often limited to special occasions like birthdays or in one case a family outing. We learned of just one family that had attempted to use video chat extensively. Limited use of other media, were largely attributed to non-use on the part of the migrant parent rather than lack of access to those tools. Most parents reported being either very busy or not technologically savvy. They also felt the mobile phone was sufficient enough for communicating with children, though not with the extended network. In the following sections, I discuss the themes which emerged from the participants' stories. I then conclude by highlighting educators' experiences with left-behind children. The first theme explains how the mobile phone with its always on, always connected capability, introduced a sense of ubiquitous availability.

3.4.1 Ubiquitous Availability: The Home Micro-infrastructure

Technology was involved in attempts to shift the infrastructure to produce a micro-infrastructure in the home to allow connectivity with family abroad. Parents sent home a variety of electronics including desktops, laptops and phones, in addition to other barrel items all designed to give the children something of the resources and experiences of the foreign country. They also sent back the payments required to operate the devices—money needed to pay for the mobile phone plan or to cover the costs of home internet service. This shifting of infrastructure led to an expectation of 'ubiquitous availability'—that one is always accessible for communication.

Parents and children talked about using the home micro-infrastructure to interact in three different ways: to exchange information on daily activities, to share sentiments and to bond through shared interests—music, fashion, family pictures and community gossip. The most frequently used technology was the mobile phone. Not surprisingly, the majority of teens used it to have phatic communication with parents, to convey needs or emotions such as *"I miss you"* or to ask about reunification plans. Parents on the other called to ask children about daily activities as a means to remain connected with the routines of their children. One child participant describes her everyday conversations with her dad abroad, *"He asks 'how's everybody' and what I ate. I share with him what I did for the day and how everybody in the scheme [community] is doing. I show off what I ate because I know it's his favorite food (P19, Child)."* Another father who had migrated with his wife leaving behind six children (in the care of the eldest sibling) explained that he knew the importance of staying connected. So he preemptively bought and set up video chat and instant messaging technologies for his children in Jamaica in the late 90s when these tools were not widespread and very expensive. *"Well, it wasn't common but I had to do it because we had to communicate. It was necessary though it was really costly (P09,*

Parent).” In a few cases, I saw this same desire to create new infrastructural opportunities for educators too. Parents sent phone calling credit to educators so they could alert parents to problems as they arose. This practice was not widespread, despite the potential it had to keep remote parents in the know.

As I found however, there were limits to the ability level of the micro-infrastructure supplied to provide ubiquitous availability. For instance, theft or fear of theft at times dictated the actual ‘mobility’ of a mobile technology for participants. One teen said she could not bring her laptop to the public library to use the free wireless Internet to communicate with her mom because her Aunt who was her new primary caregiver, was afraid it would be stolen. Others also attributed their intermittent unavailability on the delay in receiving the remittances that financed either the Internet or a cellular calling plan. And though not every family explored technologies beyond the mobile phone to connect regularly at a distance, most expressed their interest in adopting them. I next describe how this micro-infrastructure was taken up in negotiations of control.

3.4.2 Negotiating Control

A key finding of the study reveals challenges with control that the mobile phone exacerbated as it was being taken up in the extended care network. Parents, guardians and children alike used it in negotiations of control. For parents, though they moved abroad they did not necessarily relinquish their parental role. Some parents leveraged the home micro-infrastructure to remotely mediate in various household matters. Some called guardians to get their help in ensuring punishment or restrictions they have meted out to the child were followed through on. They called to remind children to do chores or homework and to mediated guardian-child tensions or advocate for the child remotely. One teen participant commented, *“A lot of times my sister would complain about things that the helpers did and didn’t do and at a point my mom even*

though she was so far away would try to call and be the mediator. She would ask the helper questions like what did my sister do or didn't do . . . (P4, Child)". Gifting a child a mobile phone was a means of maintaining direct access to the child. Intentionally or not, that type of interaction sometimes had the potential to undermine the authority of the guardian. In one case this was particularly pronounced when the parent used the phone to coordinate directly with the child about money she planned to sent. One teacher recounts this particular situation, *"The thing now is that the aunt will have her rules and then the mother will say 'but I don't want this for my child'. Even though the mother left the aunt in charge of her child she doesn't want the aunt to make certain decisions and place certain rules so the child is kind of confused in a sense and sort of acts out. The aunt is not able to do what she thinks is correct and be successful. . . the child speak to mother on the phone and the mother just sends the money into the child's account and the child goes and takes out the money which undermines everything that the aunt is trying to do. Eventually that child he is boarding now with a stranger (P17, Educator)".*

Children too were involved in this negotiation of control through mobile phones. The year 2001 and beyond changed communications for the country. It saw the deregulation of the Jamaican telephone market and the entry of Digicel (a competitor to the incumbent Cable & Wireless) and the consequent availability of new bizware (particularly cheap calling plans) [57]. It was now much cheaper for families in Jamaica to initiate call abroad than vice-versa. Cheaper call plans gave those children left behind post-deregulation control of communications with their migrant parents. Rather than having to wait for a call on their parent's schedule, they were able to initiate them at their own discretion giving them some control and causing a shift in the power balance. One participant noted how she took advantage of this only calling her mom after she did her chores, so that her mom could no longer dictate beforehand how she should go about doing it. *"When I call her everyday to tell her what I do*

in the morning, she [is going to] ask if I did the laundry... because she always do the washing. She wants to tell me how to put [the clothes] in the machine and stuff, how to wash with my hands and what clothes run. It's like she's still here! But now I just call her after and tell her how I did it... and she'll tell me where she disagrees or she'll say ok then (P12, Child)."

In other words, the troubles encountered with mobile phones were not always a consequence of the technology, but that their use allowed confusion or disagreement about the boundaries of responsibilities between parent, guardian and children to propagate and persist.

3.4.3 Heightened Sense of Connection (or Alienation)

The interviews indicate how 'more' (communication) didn't always mean 'more' (sense of connection) between parent and child. Though in some situations it did, in others it actually led to alienation. The difference that the deregulation of the Jamaican cellular market (mentioned in the previous section) and the recent accessibility of cheap international plans made for current left-behind children was striking. Teens we interviewed were left behind post-deregulation. They talked about being able to spontaneously initiate calls to their parents which often resulted in a heightened sense of connection amidst the distance. By contrast those left behind before this time (adult participants who were reflecting on their experiences) talked about needing to wait for their parent to call, since it was only the emigrant who could afford to make the call. Current children left behind were far more apt to describe their conversations as fun and interesting in contrast to our adult participants who as teens in the 90s could not initiate calls due to the expense. One current teen describes the opportunistic conversations he could have with his mom since it was cheap to call her whenever he wanted, *"If I hear a new music band that I like I will share it with her and if she hears one there, she will tell be about it (P28, Child)".* A 90s teen

by contrast felt the one-way initiating of call by parents led to their parent(s) being alienated from household matters even when their parents would call them on a daily basis. *"[In those days] we couldn't just take up the phone and call her every second, so its like ok we're gonna cling to the next person which was my stepdad. So if something exciting happened we would probably have to wait for her to call, while he was there instantly. When she calls you don't think about those silly stuff to talk about (P4, Child)."*

Another problem with the high frequency but one-way parent-initiated calls was that it could cause children to take on a rather pro-forma feeling. One child described this, *"If it was a case where I spoke to her for like three times or four times for the week then she already... it was pretty much 'hi, how are you doing, I am fine' and that was it (P4, Child)."* The dissatisfaction with one way initiated calls echoes the findings from Madianou and Miller's [47] study of Filipina migrant mothers who were also the ones to make calls. Children in that study also reported the calls as at best uninteresting and at worst actually irritating. Thus beyond technology, cost-structures alleviated or exacerbated issues already brought about by the distance.

3.4.4 Perceptions of Authenticity

Another important use of technology was to 'triangulate' the truth. Participants (including parents, guardians and children) all reported the importance of remote parents being able to hear multiple sides of a story. Based on the nature of the situation, the remote parent would make calls to different members of the child's network. An example is a parent calling an educator to verify information conveyed to him or her by the child or the guardian to verify if a child is in fact behaving or adhering to rules outlined by the parent as the child claims. *"We called to know what is happening [with the child], if there is any disciplinary problems to address (P09, Parent)".*

Guardians too, in particular non-relative guardians, were prone to being targets of parent's concerns about whether their child was receiving appropriate remittances or was being unfairly treated in any given situation. One parent stated, *"We have to know financially, if all their needs were being taken care of. Because then the monetary situation, it wasn't going directly to them, and so tactfully we had to make sure that the children were satisfied with what is going on (P09, Parent)."* One parent discussed her continued level of mistrust towards her child's non-relative guardian and how she has a neighbor keep an eye out to ensure the child's well being. In her own words she states, *"Even though [the guardian] calls every minute, you are out of the loop no matter what. Guardians may hide stuff. If they did something to the child, they won't want you to know. But I have a friend who lives in the same community. I ask her to keep an eye on my son because you can't always trust them [guardians]. So I call her and she will let me know what the situation is. That's how you have to do it (P08, Parent)."*

Thus migrant parents used technology to validate the truth and maintain a level of insight into their children's behavior and well-being. But they also used it to understand the household situation and to keep an eye on the treatment of the child by the guardian in charge.

3.5 Conclusion

The Jamaican context allows us to consider unforeseen ways in which ICTs are taken up into transnational migrant flows. In the process of crossing borders, infrastructure becomes visible even when it is not broken [83]. I found that migrants, needing to work in both systems (in their work context in the US and within the Jamaican system to continue to parent their children) were using the mobile phone infrastructure to ameliorate some of the difficulties associated with the loss of spatial anchorings when parents left. In the next chapter, I continue to discuss results from the exploratory

study. I highlight the educators' challenging experiences with left-behind children. Their almost daily interaction with children, make them important to improving a parent's awareness of their child's needs and behavior. I then detail the results of the design activities which captures the participants' visions including that of educators for a social space that connects the extended caregiving network of children left behind.

CHAPTER IV

MITIGATING DISTANCE AND TIME BARRIERS: TRANSNATIONAL HOME-SCHOOL COMMUNICATION

In this chapter I discuss the participants' visions for a social space to connect the care network of the children left behind and provide long-distance home-school communication. The design activities discussed here were conducted immediately following the interviews outlined in Section 3.2.2, with the same set of participants. Several themes arose from the participants' input. This included the need for visibility, transparency and privacy to be built into such a network for it to be comfortably adopted by users. In conclusion, I provide a list of recommendations which fed into the design of the resulting application Rivrjam in Chapter 5.

4.1 Motivation

Parental involvement is crucial for the proper social and cognitive growth of a child [42]. Children of migrant parents are at-risk as they face academic and behavioral challenges. For instance, compared to children with non-migrant parents, children left behind see higher dropout rates and fewer educational opportunities as they lose motivation to seek out such opportunities beyond the secondary level [42]. In one study as many as 63 percent of children whose parents had moved to Toronto from the Caribbean, leaving them behind, reported skipping school without good reason [70]. To improve the outcome of these children, participants articulated the need to connect all caregivers including not just those in the home but also those who take on similar care responsibilities in their work environment as well. This inspired exploration into the parent-school communication practices of this group. And through design, I

capture how participants imagined a social space better connecting them. To set the context for the visions participants highlighted in the design activities, I first briefly discuss what I encountered about the parent-school communication as it occurred (or not) for participants.

4.1.1 Educators Experiences with Left-Behind Children

Figure 2: Mobile phones (present here) and improper uniform are usually prohibited in Jamaican schools.

Educators spent much time with children in the context of their work. Yet many did not know children were left behind until problems such as violations of the school rules began to manifest. Problems at times stemmed from the increased resources (due to the remittances and goods sent home) that enticed left-behind children to break school rules, such as violating the uniform code or using banned technologies to display their new acquisitions (see Fig. 2). As one teacher explains, *"You see them wearing name brand shoes. They wear their uniform so everybody would be in the same uniform but they wear name brand shoes and bags and so on. And most times, they would be the ones who have more money to spend to buy things (P10, Educator)."* Other problems were more psychological or psychosocial in nature. A child's status as left behind, cautioned teachers to look for signs of psychological distress such as withdrawn or authoritative behavior. Fluctuating academics, could also point to an

absence of responsible guardians in the home to oversee a child's academic progress. Poor academics also resulted from children adopting a 'waiting to migrate' syndrome, i.e. the assumption that one doesn't have to work hard now because he or she will migrate to another country at any moment. One teacher describes this, *"Many of them are being promised for years that [parents abroad] are going to file for them and they're going to live abroad so then they sit in school and do nothing and I don't think the parents are making clear that they need to do well... I know of some who have become adults and they are still here (P13, Educator)."* Given the impact parental migration had on the child, educators wished to connect with migrant parents to get a sense of the child's home environment and the family's migration goals. Many however did not know or have direct access to the parent abroad to convey their concerns. Educators often relied on local guardians to address their concerns with the child or to convey it to a parent. Yet guardians were at times elderly individuals, often grandmothers who had little control over the child. In other cases guardians were the children themselves or an older young adult sibling. It was these types of concerns that drew my attention to the important role that educators have in the caregiving network and the importance of bridging the connection between them and migrant parents.

Only a few parents were able to overcome the distance and forge functional relationships with their children's educators, largely those already embedded in the necessary social networks. For instance, in cases where parents had direct access to the child's school teachers, those parents were likely teachers themselves at the same institution or had relatives or friends serving on staff at their child's school and so had the information necessary to make contact. In those situations, it was much easier for the parent to obtain information about their child's academic performance directly from the school. This echoes research which purports that a parent's social network can be used to predict parental involvement in home and school [68]. One now adult

left-behind child through reflection on her own experiences echoed the importance of continued parental involvement post migration. Her mother's continued involvement with her academics after relocating abroad, allowed the mother to sight an opportunity to provide assistance to her daughter, *"I was struggling in school and [my mom] called me and she asked me about it but I didn't tell her anything... but because [the teacher] who was helping me at the time was her friend, she told my dad, then my mom called her and she told my mom. I guess wasn't paying attention so my mom got me a tutor (P3, Adult/Previous left-behind child)".*

As mentioned in Section 3.4.1 some parents worked around the cost issue that prevented teachers from communicating with parents abroad. They either initiated calls directly to teachers or provided the teacher with calling credit allowing them to initiate calls at will, *"Good parents you know who will even send you phone credit to call or if they don't do that they just know that they must call you every two weeks or something like that (P21, Educator)."* Hence, the mobile phone, worked for some but only a few and largely only those embedded in social networks that were sustained post-migration. But for others, parents and educators alike, they wanted to connect with each other, but the opportunities to do so were lacking due to socioeconomic reasons such as costs or being disconnected from a changing network of educators.

4.2 Design Activity

As emphasized in Chapter 3, the design activity was a follow on to the interviews conducted in Jamaica. Recruitment, participants and the field site setup was previously outlined in Section 3.2. During the design activity participants were asked to draw (though some felt more comfortable writing) their vision for how a social application could be designed to help connect the network of parents, educators, guardians and children, to which the participants themselves belonged (see Fig. 3).

For the design activity, I asked them to include or discuss the types of information

Figure 3: Design activity with a teacher who participated

and artifacts they would contribute, or not, were we to build such a social space. I also spoke about the types of content they would like to see being shared by others and the audience they would share different types of content with. I also captured the perceived benefits they felt an application like that would have, whether to themselves or to others. Finally participants discussed concerns they had around the design concepts generated. Again (as in Section 3.2), I analyzed the interview data and resulting designs for thematic connections following an inductive data-driven approach [72]. I detail the results of the design activities which captures the participants' visions for a social space that connects the caregiving network of children left behind.

4.3 Results

A disconnected care network meant parents missed out on opportunities to assist in the emotional, physical and academic development of the child. It also meant caregivers such as educators who, being disconnected from parents, couldn't be as effective in their duties as hoped. Hence the participants saw the benefit a social space could have to connect all concerned parties. One teacher describes her vision, *"It would be a tremendous benefit to have all the parents and stakeholders in the child's education in one place, so I won't have to speak to the child separately and the parent doesn't have to go around trying to seek one teacher's number... It's a crucial network... It's all the partners sitting around one table so to speak and it makes*

things that much easier. The parents can see everything holistically, instead of getting it piece by piece and not knowing how to put the pieces together (P21, Educator)". In the following paragraphs, I highlight some recurring themes in the desires put forth by the participants for a social space to connect this care network.

4.3.0.1 Visibility

Migrant parents, educators and children envisioned an application that enabled visibility into the home and school life of a child. It would make members of the care network visible and accessible. Visibility into the home environment and living conditions of a child was key for educators to understand how to more effectively help them. For instance, knowing that the child lives with a grandmother or in a household without parental authority, allowed them to empathize and even understand the source of a child's behavioral issues. Also, knowing the migration situation (whether a child was expected to migrate or their parent intended to return) could help them better prepare the students for remaining in the country or transitioning abroad. Just knowing what the parent-child relationship was like could help them gauge their interactions with these children. The students however, did not always accurately, if at all, convey this information to educators as one explains: *"A lot of times most of the information I get comes from the child, [there's] nobody at home. Likely she's doing badly and when the parents or guardian come in, you have to be tactful when you're asking the questions. A lot of persons become offended when you ask about home activities. They think school and home don't mix even though they send their child from home to you every day and their children come with all the influence of home to you. So school and home does mix... So this would give me an idea, I would get feedback with the information from the adults instead of directly from the children (P13, Educator)."*

Parents too, echoed the same sentiments. Visibility into the school environment

and academic life of their children, allowed them to better site opportunities to help children. Surprisingly enough, even children vouched for visibility. They wanted parents to hear how they were performing from the educators themselves. Others, for reasons on identity, wanted a parent's presence to be made more noticeable so as to correct the misperception—that of being 'parentless'—that others conjure given their status as left behind children. *"Whenever I call [my mother] and [my friends] are here I let them talk to her... when I get pictures [of my mom] I walk with them to school. [With this network my mom] would take interest in my school work, my teachers would see that my parents are interested... They call us the endangered species (P20, Child)."* We see then, how the participants envisioned an application that would improve visibility of people and their interactions which they believe would help to establish or bridge the transnational network and provide some accountability despite the distance. Along with increasing visibility, participants also discussed transparency and privacy, as necessary features.

4.3.0.2 Transparency and Privacy

Transparency, in the context of this discussion, is information made accessible to all concerned parties. Privacy, is the notion that one is in control of who or what application has access to information one has shared. Concerning transparency, educators believed that the parent-teacher exchange should be made transparent to the child, given our target group was teenagers. Some educators for instance, believed they were of an age where they could also speak for themselves and as such should be included in conversations around academics and behavior concerning them. As one teacher stated, *"Everything here [should be shared with the student]. Why should something be said about me and I am the student and I don't know. If it's about me [the student], I am not performing to the best of my abilities let me know so that I can work on it. Transparency is important (P10, Educator)."* Not everyone however was

in full agreement with having such a level of transparency. As a result, discussions of privacy surmounted with what seemed at times to be at tension with transparency. Though most teachers did agree that having transparency was important, they were divided about the level of transparency that the network should provide. Some, like P10 above, felt everything should be done in the open, fully transparent. Those on the more conservative end however, felt they would want a network to provide sharing mechanisms that would allow them to specify who could see content they posted. This would allow them control over what information is kept private and from whom. The children too were divided on whether they wanted the parent-teacher exchange to be fully transparent or to be kept private. Those in support of full transparency said it would allow them to share their side of the story. *"Yeah I would like to see what is being said because I would like to give my side of the story (P11, Child)."* Other teens however, felt it would not be productive to do so since seeing what was said about them, if negative, would cause them to continue that behavior as an act of nonconformity.

And finally, with regards to privacy, educators felt that non-life-threatening information that was told to them by children in confidence was privileged information and should not be shared with the parent online. They felt sharing such information would infringe on that confidence. Thus there is an obvious need to find the appropriate balance between privacy (given the subject), but also transparency given the target group being teens, who should also be kept accountable for their actions. In addition, to outlining these expectations, participants, mainly the educators, expressed some hesitations. I outline these next.

4.3.0.3 Hesitation to Adopt

Educators reported seeing Social Networking Sites (SNS) as contemporary and useful for connecting with younger parents. They expressed concerns however about formality, identity, time and ecosystems related with its use. I describe these themes below.

Formality: Stemming from their experiences with SNS like Facebook, some educators expressed their concerns that adopting a social space would be difficult to monitor for appropriateness of things shared, such as pictures and comments. Additionally, educators were concerned that use of a SNS would cause the nature of the parent-teacher relationship, to become more informal which was not desirable. This was because use of SNSs encouraged colloquial language, likely in contrast with cultural expectations and generational gaps as a teacher outlines, *"If it's something like Facebook and Twitter, I don't know. Maybe because I am one of the older teachers, I think we would have lost the whole basis of formal communication... the parents will be very young and they would be [responding] in the text [short form] language and I'll have to be deciphering what it is (P10, Educator)."*

Identity verification: Some educators felt that people using an online network should be held accountable for what they wrote and so revealing a user's identity at all times was important. Anonymity in their mind, discouraged ownership of actions. Hence a network could include a means of alleviating these fears, such as providing ample means of authentication.

Time commitment: Some teachers were concerned about the time commitment utilizing a new social network would require. Expecting the application to require use of a desktop or laptop computer to access it, one teacher feared that it would encroach on her personal time or require her full attention. *"Its just too time consuming and it needs too much of you. I can walk around with the cell at my ears and do all that I am doing (P13, Educator)."* Given the ability to multi-task while on a phone call, the

same teacher was comfortable issuing her personal phone number to parents: *"Most of the children who get into trouble the parent have my number, my personal number at that so they call me anytime (P13, Educator)."* Hence the factors influencing her choice of tools were mobility and the flexibility of the platform. Thus a consideration for how the system will integrate with teachers existing work practices so as not to create additional work is needed.

The ecosystem: Lastly, other teachers were hesitant because they felt the success of such a tool would require other things to be in place such as better school facilities. And for those in large public schools with classes of over 40 students, smaller class sizes. They felt this would allow them to spend more time observing individual students and communicating with their families.

To drive acceptance of the technology by the users, requires mitigating these concerns outlined. I now shift to a set of recommendations pulled forth from these findings.

4.4 Recommendations

Our participants were enthusiastic about having a network that would bridge communication between home, school and the parents abroad, overcoming time and distance limitations. While social networking tools had the technological capabilities to do so, current tools were not tailored to reflect the desires of the network such as transparency and visibility. Privacy too is difficult to control on those platforms. Accidentally posting personal information about a child publicly on Facebook for instance could have irreversible consequences for all. For these and other reasons outlined in Section 4.3, educators and parents alike were not utilizing existing social networking sites to communicate. A tailored network for this group should provide a view into the home conditions and school situation of these at-risk children. Educators should be able to unobtrusively acquire information from parents and guardians on the home

life. Parents should be able to gain insight into the academic progress of a child from educators, as well as any challenges that could benefit from intervention on their part. I highlight considerations to make when designing technologies to keep migrant parents engaged in the home and school life of their children from a distance.

4.4.1 Design for a Diverse Network

Though individuals all wanted to increase information sharing among members of the care network, they expressed differences in their vision for a social space. Teachers felt a social space would allow them to engage with the child's household and parents abroad, which would help them to better serve their students. Not wanting to be called parentless, children saw it as a way to improve their identity by making a parent's involvement in their life more visible. And guardians felt it would help to alleviate them of some caregiving duties by allowing migrants to assume some parental roles at a distance. Parents of course, wanted to parent, i.e. provide emotional and physical care for children in spite of the distance. The manner in which these different groups wanted to engage and interact with each other on the network was different. Children wanted frequent and engaging interactions such as the ability to post pictures and leave comments, similar to how they engaged on informal social networks. By contrast, teachers wanted more restricted engagement and interactions that are not time consuming and that retains the formality of the parent-teacher communication. And parents desired more frequent engagement, so as not to miss out on daily activities and the child's progress in school. Finally, guardians wanted to engage only as needed, since they viewed such a platform more as a tool to engage the remote parent. To then balance the desires of such a varied group of users, one would need to design the system in a way that caters to a diverse group of individuals with differing expectations for what interaction on a social space should look like. For teachers, it would need to have a more formal look and feel and

encourage accountability and the use of formal speech and positive language. This would mirror their expectations and offline experiences. And given children's desire for informal communication, designing a separate space or integrating the application with tools they already use may be a better approach. And for parents, a constant stream of content coming in from different individuals would help them feel in the loop.

4.4.2 (Re)building the 'Trust' Network

Trust is important in transnational networks because it provides the supporting structure for the exchange of information, support, remittances and so forth during migration [74]. And the generation of trust in a group is contingent on the ability to forge strong ties with others [74]. The distance that comes about with migration however, often prevents the formation of strong ties which facilitates trust, particularly between parents and teachers who often lacked a means of connecting with each other. Hence connecting the care network in a way that leads to increased transparency and accountability facilitates the development of strong ties, allowing for trust to develop between members of the network. We saw how a teacher, able to forge this strong tie with a parent abroad, was willing to take on other duties such as mediating financial transactions between the parent and child. Hence a network should keep the lines of communication open, allowing for individuals to develop and define their trust relationships and set forth expectations.

4.4.3 Provide Features for Transparency, Privacy and Visibility

Finally, socially translucent systems allow social norms to be present during interactions online by allowing individuals in a distributed group to 'see' each others actions, thus providing accountability for one's actions and enabling people to conform to social norms [20]. Our participants brought up the need for visibility of actions and

communication. For instance, participants were split wanting some level of transparency but also privacy. Following social translucence approaches, an application could for instance, allow children to see and comment on the messages exchanged between a parent and an educator. Or a more conservative approach would perhaps conceal the specific details of the parent-teacher exchange but send a notification text to the child that an exchange occurred. Such a design could help to balance the tension between privacy and transparency. As an added benefit in this case, it could discourage behaviors outside of social norms such as over-surveillance by 'helicopter' parents.

In terms of visibility, we saw how important it was to children that others see the level of involvement and engagement their geographically distant parent had in their lives. A social space could make the interactions of parents more visible by allowing parents to comment on content shared by others such as a picture of the child receiving an award at school, which could then be made visible to other members of the network. Additionally, since migrant parents are unable to attend parent-teacher meetings, it could provide polls to migrant parents beforehand and display their responses alongside their image to increase the visibility to non-immigrant parents during Parent-Teacher Association (PTA) meetings. Considering the negatives as well, increasing visibility in this way could further marginalize those children whose parents are not only absent but in fact inactive in their lives or those who simply choose not to use the application to connect with the care network.

4.5 Conclusion

Given the reasons for parental migration are usually an economic strategy meant to improve the outcome for families, the need to bridge the communication between not only migrant parents and children, but between the members of the child's caregiving

network as well, is an important step to supporting parent-child connectedness. Research shows how children with migrant parents, are three-times more likely to have academic and behavioral challenges than children with parents who live locally—a disadvantage that could be lessened with more parent-school involvement [42]. As such, bridging the parent-school communication is especially important given educators heavily interact with children on a daily basis but are most often omitted from conversations concerning the child. These insights serve as a first step towards the design of a social space to support transnational parent-school communication. It opened up the question of whether engaging parents in this manner will help them to stay informed and engaged in their parental roles while living abroad. Could it help them to spot opportunities for intervention in their child's life despite the distance? Would doing so mitigate some of the negative developmental challenges faced by children left behind? Moreover, how exactly should these tools integrate with existing infrastructure and into the school system (e.g. forming part of a teacher's activities)? To this end I developed an asynchronous message exchange system, Rivrjam (named so since it was conceived as and IVR system for use in Jamaica). I use it as a means of exploring some of these questions through a technology intervention. In Chapter 5, I outline the design process that led to the development of the system and the subsequent deployment and evaluation of the application in the Jamaican High School system.

CHAPTER V

DESIGNING RIVRJAM FOR REMOTE HOME-SCHOOL COMMUNICATION

One of the goals of my research is to explore ways to increase the engagement of migrant parents in the home and school life of children during long-term migration and separation. Given the tensions I saw in Chapter 4, in the different users' desires for a social space, as an initial step I chose to focus specifically on designing a system to connect just two of the members of the care network that needed to speak urgently but didn't—migrant parents and educators. I set out to design a system following user-centered design practices which emphasize involving the user and accounting for their needs throughout the design process [17]. The resulting system, Rivrjam, is an Interactive Voice Response (IVR) system, both web-mediated and phone accessible, to support the flow of information between local schools in Jamaica and migrant parents now living outside the country. Parents and educators can interact back and forth by sending voice and/or text messages through the system.

I will first begin with a discussion of the research approach and design process I followed, highlighting the lessons learned during the design iterations with users (Section 5.1). This helped to shape the resulting application outlined in Section 5.2. Section 5.3 follows on with a description of the place it was deployed and methods used. I then highlight the results of the deployment, outlining how Rivrjam was used and the impact it had on the parent-child relationship for those that used it actively. This is followed by a discussion and conclusion of this work.

5.1 Iterative Design

My research spanned multiple sites in three countries to include migrant parents residing in the United States and the United Kingdom as well as Jamaica where the educators and children resided. I describe how this played out during the iterative design phase.

Iterative design is a cyclical process that includes prototyping, testing and refining a system while including end users in the process [17]. For the project, I needed to develop an application that included a web interface, as well as a separate voice interface—built on IVR technology—to provide users options for interacting with the system. To do this, over the period of one semester (5 months), I consulted with a total of seven users at different stages of the iterative design phase. Given my study was multi-country, involving users in-person in multiple design iterations was not always feasible, so I did some of the inquiry remotely.

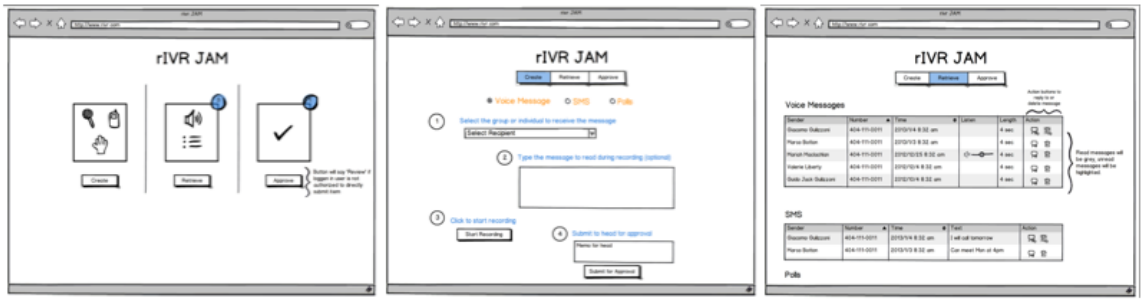

Figure 4: Rivrjam wireframes

I began with ***designing wireframes*** of the web interface (See Fig. 4) which I used to conduct cognitive walkthroughs. This was done remotely via voice calls with educators in Jamaica, since the website was being designed to suit their needs. Parents, on the other hand were just expected to call the local Rivrjam number to retrieve messages, though they too had access to the website. A cognitive walkthrough was done as a check to see whether the application lined up with a user's mental model of how it would work. I chose to do a ***verbal cognitive walkthrough*** since access

to screen sharing tools was not immediately available to my participants. In the verbal cognitive walkthrough, I made the user progress though the 'interface' while I told him/her what actions were available each step of the way. The simplicity of the wireframe prototype lent itself well to doing a walkthrough of this nature. As an example, for one task the participant was asked to send a message to all parents about a general event happening at the school. The different actions were to 1) log in to the system, 2) choose a list of recipients, 3) record a message, 4) submit it directly to all parents. The participant then progressed through the tasks by verbally selecting from the set of available actions that would help him/her to fulfill all the steps in the task. Overall participants expressed enthusiasm about the application. Our main informant was a dual position educator, (i.e. Vice Principal and teacher) at a private high school. Following his recommendations, we made some changes to the interface such as providing the option for messages created by a teacher, to be routed to the vice principal for approval, given he felt messages were representative of the school and needed to be well-written.

For the second iteration, I, (along with another student), ***developed a high-level HTML prototype*** of the application. During my travel to Jamaica, I tested it with five people—three teachers and two principals at two high schools (a large public school, and a small private school) in the south-central parish of Jamaica. I had them follow a similar flow going through the process of creating and retrieving messages. In addition to this, I ***conducted observations in and outside of the classroom***, since this helps researchers capture information about a users' context, which may be unfamiliar [26].

This involved shadowing several teachers for two days at one of the high schools and doing shorter observations for a few hours at the other high school. I took detailed field notes in a notebook as well as pictures and videos of the environment capturing the tools available for instance (see Fig. 5). The baseline data gathered from this

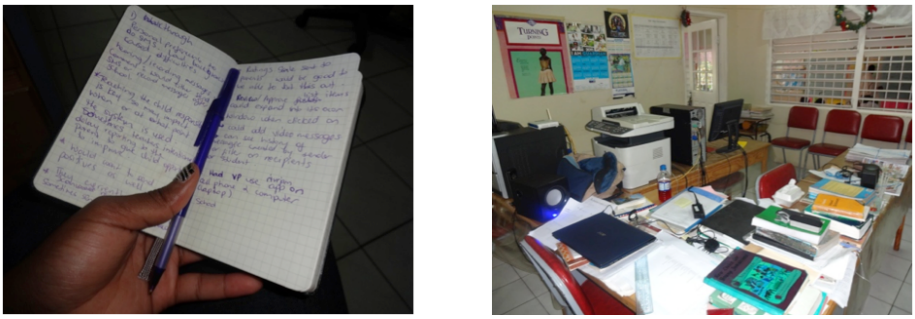

Figure 5: Documenting observations through notes and photos: (a) Researcher's field notes, (b) Staff room showing equipment available

helped to further inform the design of the system and enabled me to envision how the application would fit in with the daily life of the educators as well as the infrastructure available to them. For instance, I found that noise level and lack of privacy posed a challenge to recording voice messages. This caused us to shift from voice-only messages to allow for text-based messages to also be sent through the application. In addition to testing the system, I spent time building a relationship with a large public school where the deployment of the system would take place. This started with conversations with the school's principal who gave approval for the project and who introduced us to the school's two guidance counselors who would serve as our point of contact moving forward. These points of contact, also know as 'intermeds' (intermediaries) or 'human access points' [49], are useful as they help to identify potential participants, champion the research and explain it to others.

As a final step of the design phase, I ***developed a fully functional version*** of the application. I ran a ***remote pilot test*** of this with three high school teachers from the same private school previously mentioned. I did this remotely via Skype. I had the teachers register on Rivrjam and send messages to parents (dummy accounts). The results of this pilot informed some modification to the system which included: 1) adding functionality to (optionally) route messages to an admin for approval prior to it being sent out, 2) adding the capability to send both voice and/or text messages combined (especially in situations where messages had to be sent out in noisy staff

rooms), 3) read receipt confirmation of if and when messages were played and 4) options for sorting and filtering through messages.

5.2 System Overview

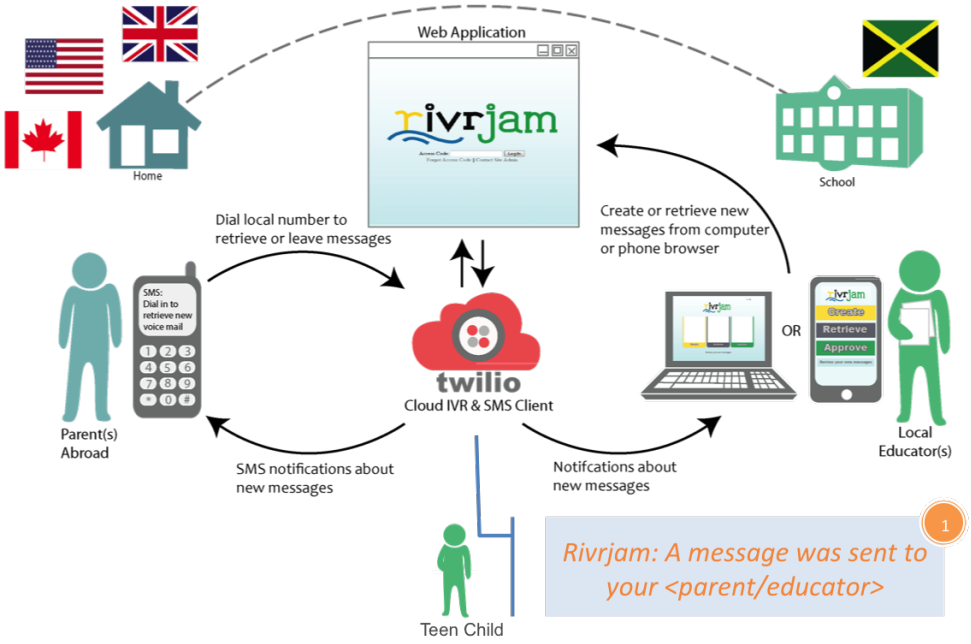

Figure 6: Rivrjam system overview

Rivrjam is an integrated web and voice/text messaging system built on top of the Twilio Interactive Voice Response (IVR) platform (see Fig. 6). As such, it is accessible both by calling a local number to retrieve or create voice messages and via the web client where both voice and text messages can be created or retrieved. The web client was developed using a mix of PHP and JavaScript, while its IVR capabilities was developed using the Twilio Markup Language (TwiML) and the Twilio REST API. Data was stored in a MySQL database. Each user was given a system-assigned voicemail box that stores the messages. The system has parents pair with the registered educators that interact with their children. Parents (who accessed Rivrjam primarily by phone) and educators (who accessed it only on the web) could interact back and forth by sending voice and/or text messages through

the application. Parents dialed a local US or UK number based on where they were located to access their mailbox. Given most educators in Jamaica had pre-paid mobile phone plans that would incur costs if they had to call into the system like parents did, we had them access their mailbox through a separate web-based client on their computer or mobile phone. Most already had a Mobile Internet plan which facilitated this on a smart phone. Text-based messages created from the web were delivered as texts directly to the recipient's mobile phone and was also stored on the website in the user's account. Voice messages were accessible through the website or by calling one of the local US or UK numbers (provided to participants). Each time a voicemail was sent the recipient got an SMS text notification prompting them to check their Rivrjam mailbox.

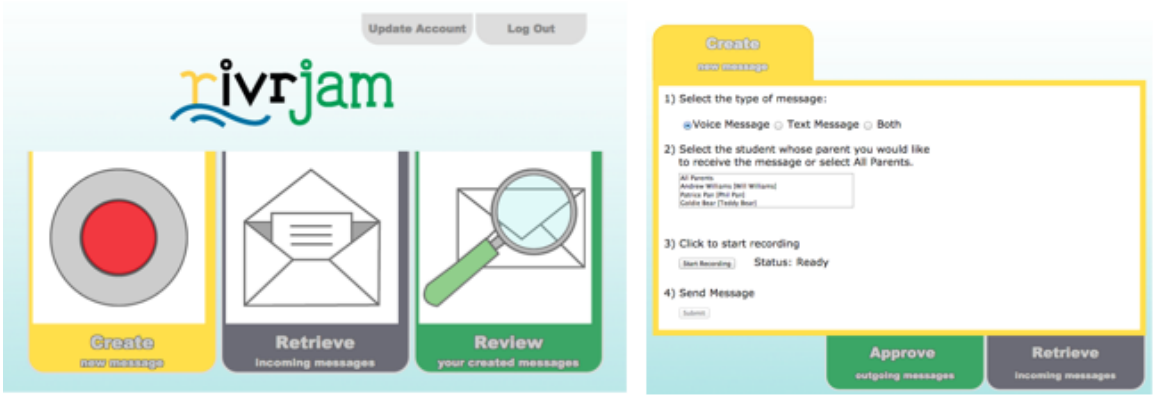

Figure 7: Rivrjam interface - Main and create message pages

Parents upon registration could optionally register their teen's mobile phone number. All parents opted to do this. Registered teens received an SMS text notification whenever their parent and teacher exchanged messages. This was to accommodate the educators' desire (in Section 4.3) for remaining transparent to children about the occurrence of parent-teacher exchanges. The text simply stated that a message was sent via Rivrjam, and indicated the direction in which is was sent—whether from the parent to the teacher or vice versa. To maintain some level of privacy,the content, sender or recipient of the message were not revealed however. Overall the five main

capabilities of the system, were to create, reply to or retrieve messages, review messages created and for administrators, approve messages routed to them (See Fig. 7). Following the end of the design phase, we continued with a ***deployment and field evaluation of the application***. I first discuss the recruitment process and the resulting set of participants that enrolled to use the system.

5.3 Rivrjam Deployment and Field Evaluation

To evaluate the application, we conducted a 9 week deployment of Rivrtran at a large public school in an urban center of a rural parish. This was the larger of the two schools from which we had informants during the design iteration.

5.3.1 Recruitment and Participants

Table 3: Rivrjam Participant Families

Family	Child's Gender	Parent abroad	Parent's Country of Residence	Separation duration	Guardian
A	F	Dad	UK	3 years (no visits)	Grandmother
B	F	Dad	UK	13 years (no visits)	Mother
C	F	Dad	USA	4 years (no visits)	Uncle
D	F	Dad	UK	13 years (1-2 visits)	Mother/Stepdad
E	M	Mom	UK	11 years (no visits)	Family Friend or Grandmother

Recruitment was initiated during the tail end of the design phase (May 2013). Contacting families and getting them enrolled took several months due to time differences and parents being hard to reach. Schools were out for the summer so actual use of the system did not begin until the beginning of the new school year (September

2013). Students with migrant parents abroad were identified and/or recruited by the guidance counselor who announced the study in several classes. Students who met the criteria and had an interest in learning more about the study, gave their parent's contact information to the guidance counselor. The counselor then contacted the parents to gauge their interest and request permission to pass on their contact information to me. I then contacted these parents to obtain consent for both themselves and their children to participate in the study. Children gave their verbal assent after parents consented. Only parents based in the US and UK, two of the top receiving countries for migrants from Jamaica, were enrolled in the study. For each child included, their migrant parent and current homeroom teacher (known as form teacher in Jamaica) were also enrolled. In addition we interviewed an extra informant, a former homeroom teacher for one of the children. Overall five families joined (see Table 3) resulting in 16 participants total. Long-term migration was the reality for all of our participants whose parents had been living away between 3 to 14 years. Many had not see their migrant parents since they left. Those that did, saw them at most 1 to 2 times during the separation period. Teachers enrolled in the study by visiting the website and registering with an access code. Following this they were presented with an electronic consent form to which they had to agree in order to activate their account on the system.

5.3.2 Data Collection and Analysis

The following were the methods conducted and data collected before during and after the deployment.

1. Pre-deployment: Administered the Parent-Child Relationship Survey and conducted pre-interviews with participants to understand the family dynamics and parent-school communication prior to the deployment

2. Bi-monthly during deployment: Conducted 5-minute check-ins (diary pings)

with children via phone. Asked questions such as, *What did you talk to your parent about this week?*

3. Mid-deployment: Conducted phone interviews with teachers and parents about their use of Rivrjam and usability challenges

4. Post-deployment: Conducted phone interviews with teachers and parents (who actively used Rivrjam) to discuss their experience with Rivrjam and the outcomes

5. Post-deployment: Collected Rivrjam log data

To get a sense of the parent-child relationship (emotional bond) prior to the use of Rivrjam, both parents and children were asked to complete an online survey and a pre-test interview beforehand. The survey I administered—The Parent-Child Relationship Questionnaire (PCRQ) [25]—is a validated measure of the parent-child relationship adapted from Child Development Studies in Psychology. There were two versions, one for the child and one for the parent (see Appendix A). The survey has 19 subscales and 5 factors that span items such as protectiveness, similarity, admiration of and by the parent, deprivation of privileges and companionship and combine to form different factors. I also included four additional questions that measured the parent's academic involvement. The survey was administered in an online format to allow children to complete it in their school's computer lab, while parents completed it on their own time. Survey responses from 3 parent-child pairs and two children were received. The remaining two parents who due to busy schedules or literacy challenges were unable to complete it. To make up for this, both were probed more during the phone interviews that followed and we consulted with an extra informant, a former homeroom teacher for the child of one of the parents.

Following completion of the survey, I interviewed the participants. Interviews were done in-person for over half of the children (at their school in Jamaica), but remotely

over the phone for the rest. The migrant parents (in the US and UK) were all interviewed via phone. During the interviews, questions to both parents and children examined parenting styles (would you describe yourself/your parent as strict, why), the parent-child relationship (closeness, topics discussed with each other), disciplinary practices (such a whether a parent withholds gifts or money for poor behavior), awareness of the child's needs (how a parents obtains information about their child), the parent-guardian relationship and the parent's academic involvement. I also asked specific questions related to areas where there were parent-child discrepancies in the survey results (without indicating this) to further unpack the reasons. Following the pre-interviews and survey, migrant parents and educators registered on Rivrjam and I informed them how to use the application and to send their first introduction messages. Parents enrolled their children's numbers so they could receive the text notifications when parent-teacher exchanges occurred.

The following were steps I took to analyze the data. Recorded interviews were transcribed and coded following an inductive data-driven approach which identified thematic connections in the data [72]. The content analysis done on log data, followed a more deductive, direct approach, in which an initial set of codes (gathered from my previous research findings on the types of information users wanted to share on the system) were used to code the logfile [35]. Each message sent via the system was assessed to see which codes it related to and additional codes were added as needed. The codes spanned the follow types: topics, actions and (for voice messages) tone of voice. Once a complete set of codes were generated, a second researcher used this to also code a subset of the log data. Codes for tone of voice were derived from an extensive list of voice tones. To ensure agreement, both researchers then met to discuss codes and areas where there were discrepancies in the coding categories. Both researchers then (re)coded all log data based on this shared understanding. Finally, I spent some time looking for correlations between the log and interview data, such

as instances of themes that arose during a similar time-frame in both the bi-monthly check-ins with children and the Rivrjam log data for that period. This suggested instances where children's offline conversations with parents may have influenced or been influenced by the parent-teacher conversations on Rivrjam.

5.4 Pre-Deployment Family and School Dynamics

Consistent in both the pre-survey and pre-interviews is that across the board parents and children had high affection for each other. Figure 8 shows a summary of the family dynamics of the participants. It highlights where they had very similar and very different perceptions of the parent-child relationship. It also shows the strongest characteristics of the parent-child connection as well as the most problematic characteristics of the relationship based on the combined perception of the parent-child pairs enrolled. Bolded characteristics were ones in which both parent and child pair were in very high agreement.

Family	Shared Perceptions	Differing Perceptions	Positive	Negative
A	• **Highly affectionate** • **Somewhat similar** • **Not too much verbal punishment** • **Low companionship** • Very possessive • Somewhat prosocial (do things for each other) • Hardly intimate • Hardly democratic approach • Low guilt induction	• Parent admired child less than child perceived • Parent felt he deprived the child far less than child thought • Parent felt far less nurturing to child, • Parent felt far less involved in child's academic	• Affectionate • Hardly uses verbal punishment or induce guilt	• Low companionship
B	• N/A	• N/A	• Affectionate • Admiration of and by parent • Hardly disagree/quarrel • Hardly deprive of privileges or give verbal punishment or induce guilt	• None
C	• N/A	• N/A	• Hardly dominant • High admiration by parent	• Hardly similar • Hardly take democratic approach
D	• **Very affectionate** • **Hardly protective** • **Hardly disagree/quarrel** • **Hardly prosocial (do things for each other)** • **Issues physical punishment** • **Strong admiration for and by parent** • **Somewhat takes away privileges** • **Very democratic approach** • Hardly similar or intimate • Gives some praise	• Parent felt more dominant that child perceives him to be, Child feels greater companionship with father than he perceives	• Hardly disagree/quarrel • Strong admiration for and by parent • Very democratic approach	• Hardly protective • Hardly involved academically • Hardly prosocial (do things for each other)
E	• **Low praise, intimacy and companionship** • **Some deprivation of privileges** • Parent very much involved academically • Parent somewhat induces guilt and punishes verbally • Hardly similar or prosocial (do things for each other) • Much disagreements (quarrels) • High affection	• Child admired parent more than parent felt, parent felt more nurturing than child perceived	• Affectionate	• Much disagreements, Low companionship, Not very intimate, Hardly similar, Low praise form parent • Hardly prosocial (do things for each other)

Figure 8: Parent-child relationship survey results showing parent's and children's perceptions of their relationship (Note: B and C includes data from the child alone)

From the survey in particular however, parents in general viewed themselves as more possessive of their children than their children did. On the other hand children perceived parents to be much more protective of them than parents felt. From interview data, I found that parents found it hard to keep the lines of communication open with children. The long-term separation made building connecting with children or parents (such as developing an understanding of who they are) or rebuilding broken parent-child relationships difficult. This for some parents fed into a sense of helplessness given the distance. Nevertheless, I found that the majority of parents were active in their approach to seeking information about the home and school life of the child. Some sourced this information from the guardian or the child themselves, and for few, by contacting the school directly.

The families' technology use patterns reflected what was captured in Chapter 3—the mobile phone dominated the parent-child communication. Likewise, we found the parent-school communication was lacking for most participants enrolled in the study. Even parents in communication with the schools weren't connected to the people that really mattered, such as the homeroom teacher (known as the form teacher in Jamaica). Parents and children alike saw room for improvement in this area. Attempts were made by parents to connect with the school via email and phone and to even receive documents such as report cards from the school via fax, though with much frustration. For instance, email was not widely used for professional purposes and teachers only had their personal email which many didn't check routinely. Email then, was not a reliable means of communicating with teachers. Calling the school by phone was also insufficient as teachers didn't have personal extensions and so needed to be present in the staff room to take a call. Unless a teacher distributed their private number (which most didn't desire to do), time coordination and lack of privacy made direct phone calls difficult. Yet the participants knew the benefit of having good parent-school communication. Parents wanted direct connection with the educators

who interacted the most with their children. Teachers felt it would help parents to better enforce rules for their children leading to improved behavior. The believed this in turn would improve their own interactions with the child. Following this baseline data collection phase, I had participants begin using the system over a two month period. I discuss the results of this in the next section.

5.5 Results

Altogether 40 messages were exchanged on the system. Coding of the messages yielded 8 different topics areas: *academic performance, behavioral or disciplinary matters, general school information, administrative or fees, system related or technical help, introduction or information about self, attendance, household or family information* and four categories of actions: *opinions* (such as on a child's behavior), *requests* (e.g. to verify details), *confirmations* and *expressions of gratitude*. In addition, a range of 8 tone of voice were coded by researchers in the voice messages: *light, stern, normal, annoyed, urgent, worried, angry,* and *distraught*. For all but one of the text messages, both researchers were unable to detect a voice tone as we felt the text messages didn't provide sufficient information to do so. Each topic was coded in at least ten percent of the messages. Outside of system-related messages (e.g. account notifications, requests for technical assistance with Rivrjam), academic performance, behavior or disciplinary matters and administrative topics (e.g. exam fee due dates) were discussed the most.

5.5.1 Improving the Parent-Child Communication

Below I highlight ways in which Rivrjam proved useful, though largely these results reflect the experience of the more active users within the deployment.

Bridges connections: Children felt Rivrjam was a useful tool for parents to get credible information concerning their academic progress directly from the source and to confirm requests children made for needs such as school examination fees. One

child explained why this was useful, *"like when I call him and tell him the amount of money that I need to do my [exam] practical, when he calls and talks to the teacher directly, the teacher can say, 'Yes this is it'. Then I would have nothing else to say more than, 'This is it'."* In fact I found instances of this inquiry being made. One parent asked a teacher if she could directly send her child's examination fee to the teacher to ensure its timely receipt. The teacher denied this request however, given her time schedule did not allow for her to collect the money from the money transfer agency.

Broadens emotions: Through the inclusion of voice messages, we saw how Rivrjam allowed for a wide range of emotions to be captured than text messages, similar to results other researchers have found with using voice-based platforms to exchange messages [27]. While detecting voice tone was difficult in text messages, voice messages allowed for much emotions to be captured through changing voice tones. Parents sent mostly voice messages, however teachers still exclusively sent text messages due to personal preference or given constraints like privacy, noisy staff rooms or not having access to a microphone. Teachers however favored receiving voice messages from parents as they could better empathize with them. I found that as familiarity progressed and the topic discussed broadened between parent and teacher, a wider range of emotions was conveyed in voice messages. For instance, one parent went from conveying one voice tone in the initial messages she sent out to as many as six different voice tones in her final set of messages. One teacher reported on the benefit this orality provided, *"It's great because I was able to hear what the parent was saying, and I was able to send a text message in response."* It even allowed teachers to sense when a message was urgent or the parent was getting frustrated.

Broadens discussions: Rivrjam was found to be beneficial for some participant children who said they were not communicative or 'good at explaining stuff' to a parent. From the bi-weekly diary pings with one teen, I saw cases where messages

exchanged via Rivrjam between his mother and his teacher fed into the conversations his mother had with him. For instance, she asked specific questions about school such as his preparations for exams. She however didn't disclose that the teacher had shared with her that he had not been recommended to sit any of the exams in any subject area. The teacher had also informed this mother that her son seemed ''a little lost' indication his withdrawal behavior in classes. As a result the parent made an effort to remind her son that he could confidentially share any details of his life with her.

Next I discuss a case study of one parent-teacher pair to demonstrate the additional impact the application had on a family.

5.5.2 Case Study: Elizabeth and Son

There was one mother, Elizabeth, who was very active on Rivrjam, sending or receiving the majority of the messages in the system as frequently as once to twice a week. As seen in Table 3, this mother (from Family E), had been separated from her son for over 10 years (with no visits) but served as the primary parent and main financial provider for her son. I use her as a case study to identify the range of capabilities and level of awareness the application provided to a parent who was actively parenting.

Elizabeth and her son do not have an open relationship, despite Elizabeth's efforts to create an atmosphere for him to openly share things with her. During the bi-weekly pings he often discussed different events (good and bad) that occurred during his week but always admitted to not sharing any of it with his mother. Elizabeth has had to overly rely on other people to provide her with information regarding her son. Prior to Rivrjam, Elizabeth made connections with the guidance counselor via the phone-based WhatsApp messenger. For her, the benefit of Rivrjam was that she could now correspond directly with her son's new homeroom teacher whom she had never met. From day one Elizabeth was proactive, she reached out to the teacher

through Rivrjam before the teacher had even sent the introductory message. For the first month Elizabeth used the system exclusively on the phone, then, wanting to confirm if and when her messages were read began using it on the website. There she reported viewing read receipt confirmations which displayed whether messages were listened to and tracked her message history. From the log history I see how she would access the web client but still send messages via the phone client. Only on one occasion did she use the online application to send a text message to the admin. All other messages she recorded were strictly voice. Messages Elizabeth sent through Rivrjam spanned all 8 topics, 4 categories of actions and 8 voice tones we coded, indicating a range of emotions in her messages. She requested information about her son's academic progress, due date for fees and to inquire about school closing dates. She used it too to request counseling sessions for her child through his teacher. She also shared insight into the family migration plans and other non-school situations such as risky behaviors in which the child was engaged. The teacher was quick to respond to requests and to offer even more insight into the child's behavior and academic progress at school and to verify information the mother heard about the student. Through Elizabeth, we see one case of how the application enhanced a parent's ability and awareness of the child in several ways.

5.5.3 Children's Response to Text Notifications

Text notifications to children brought about the transparency desired by children and teachers, balanced with a level of privacy. Reactions to the receipt of these messages varied. Children felt either worried or indifferent, depending on whether they felt they had done something wrong or not. One discussed her reaction, *"Once I know I'm not doing bad I wouldn't be worried but once I know I did something bad I would be kind of worried."* Still, all the children thought the notifications were important as it made them aware that their parent and teacher were communicating. I uncovered

three ways children responded to receiving these notifications:

1. *Inquire:* Children who already communicated openly with parents, found it easy to inquire about the parent-educator exchange whenever they received a notification. As one child stated, *"I can call him and tell him I got the message and probably if he feels like, he would tell me. We have a close relationship so he would tell me."* Others chose to inquire because they wanted to know the details of a notification when it occurred typically so they could tell their side of the story or dissuade a parent's anger. One girl's approach was to beat Rivrjam to the chase by self-disclosing any negative behavior to her parent before the teacher had a chase to. She states, *"If [I get a notification] I would call him and talk to him about it. Probably even before he gets the message that I did something, I would tell him myself."* Prior to the system or in its absence however, she stated that she would not have disclosed this information. Her reason for this self-disclosure was to get the opportunity to voice her opinion on the matter at hand before any external influence.

2. *Facilitate discussion:* While children who were already in open communication with parents found it easy to inquire about the nature of a message, others were more hesitant to do so. In such cases they would initiate a phone call to the parent, soon after receiving a message as a means of facilitating a discussion about it. They however allowed a parent to acknowledge and discuss the nature of the message (if inclined to do so), making no inquiry of it otherwise. For one child, the reason for this approach was to mitigate any potential parent-child tension that could occur as her father often responded with anger and/or acted impulsively upon hearing about any negative behavior. *"I would feel a way because I don't know what my father is saying or what the teacher is saying. So I'm going to be afraid if he'll curse me and not want to talk back to me*

ever." In spite of this, she thought it was still important for her to receive the notifications and for her parent to be able to connect with her teacher.

3. *Ignore:* Finally, some children were indifferent when they received notifications, stating that they would not call the parent to inquire or even facilitate a discussion about it. Reasons for being indifferent stemmed from perceptions of good behavior (and as such no need to worry). It could also reflected broader challenges to the parent-child communication such as poor communication or authoritative parenting styles that did not facilitate productive parent-child discussions.

Additionally, I found that simple knowledge of the system being in place, spawned a desire in some children to improve their behavior. Shortly after the deployment one child stated, *"Every week I'm in the Dean of Discipline's office for wearing short uniform, being disrespectful of teachers and cursing bad words. [Because of this application] everything will change! I'll make long uniform, I'll stop being disrespectful and improve my behavior just because, every minute my father will call and say I heard this in school about you and I will get fed up about it and stop giving trouble."*

5.5.4 Barriers to Rivrjam Usage

Three of five teachers made attempts to actively use the Rivrjam application. Some however faced barriers which prevented use and/or continued use of the application or situations which limited what and when they communicated. I list these below.

Unresponsive parents: Reasons for lack of response to educators messages by the parents varied. Parents often blamed their busy schedules—the majority of them worked long hours and multiple jobs—and so felt unable to follow-up with responding to messages. Parental neglect was another reason, for at least one of the children. In an interview with a former teacher for this child, the teacher reported having conveyed an issue with the child to the parent through the guardian. The guardian

confirmed passing this message on to the father, but despite this, the teacher found nothing being done to address the issue and no attempts made from the parent to communicate with him. The current form teacher encountered and reported the same issue via Rivrjam, going as far as saying that he would have to bring in the appropriate authorities if nothing was done about the situation. Despite delivery of the message through the system however, the parent still did not make an effort to respond to the teacher and the problem persisted. This caused frustration on the teacher's part and as a result, he discontinued using the application due to the lack of response by the parent. And in another case, a parent, made aware of challenges with his daughter via Rivrjam, decided to respond in person to the teacher instead of via the system, since he would be visiting Jamaica soon. So he incorporated a visit to the school and met with the homeroom teacher in person. In this last case, we see how *non-use* of the system could be viewed as positive a metric as is *use* of the system in other situations.

Lack of positive messages: Teachers and parents alike mentioned the importance of balancing the positives with the negatives. One teacher who believed this, delayed her use of the system because she wanted to start off by sending the parent a positive message. She stated, *"I am waiting for something positive to send to the dad. I don't have a positive to relate to the dad."* Hence, unable to find any positives within the timeframe of the deployment, she didn't end up sending many messages through the application.

Collocated guardian: At least one teacher was already in good communication with the collocated parent found it easier to continue her communication with the collocated person. She felt the migrant father registered on rivrjam did not have enough background surrounding an issue to have an input. This limited her communication with him, she explains, *"It's easier to explain to the mother who is here what is happening... because I would have to explain the whole background to the dad. But*

I will bring him up-to-date about something general."

Teaching children responsibility: In the initial interview we found that for some teachers, teaching the child responsibility is key. One teacher said that he would intentionally delay reporting negative observations of the child to the parent to give the child an opportunity to improve. This sort of practice then has impact on when or at what point the system is used. Again in this situation *non-use* of the system could be viewed as a positive metric.

Technical preferences: Beyond simple access (given all 'had' access to the capabilities to utilize the system), convenient access was also a barrier to use of the system as some teachers preferred to check messages at home rather than at school where the capabilities were. Others preferred checking it on their own devices and needed to then coordinate bringing the device to school to be able to access the Internet when it was not available at their homes.

5.6 Discussion

From the pre-interviews I conducted, I found that all participants were hopeful about the benefits of the Rivrjam application, as they felt it would connect two groups of people who needed to communicate but didn't. And from the case study we saw a strong example of how its presence helped to enhance the parenting capability of one migrant parent from a distance. Below I emphasize some key takeaways though framed largely around the case study with Elizabeth:

Trust through verification: Through the case study with Elizabeth, we see the potential for Rivrjam to bridge connections and improve perceptions of authenticity as parents could use it to verify information directly with educators in a way that did not undermine the parent-child trust relationship. Even children as reported, understood this as a benefit to improving the relationship they had with a parent.

Disclosure and compliance: I saw how the introduction of Rivrjam and its

use of social translucency through text notifications to children (of a parent-teacher exchange) encouraged disclosure and compliance on their part. It also discouraged practices of withholding the truth—a tactic employed by children and guardians to avert conflict in cases where the migrant parent was easily angered. Some children, as we saw developed new approaches—self-disclosure—as a means of mitigating conflict. I also saw how Rivrjam facilitated an approach similar to that taken between parent and guardian, where, in cases of guardian-child discrepancies about what a parent desired concerning a matter, the guardian would simply call the parent to verify. With the presence of the application, the same approach was taken in cases of parent-child or teacher-child discrepancies. One could easily contact the other, to confirm or deny what a child said, or to convey their desire about how a matter should be handled. This discouraged surreptitious behavior and encouraging compliance on the child's part.

Gatekeeping: Rivrjam brings about changes to the parent-guardian dynamics in ways that others in the care network may find desirable or undesirable. For instance, a parent could now bypass the guardian to obtain information about the child and even be the ones to convey this information back to the local guardian. This type of interaction seemed to be desirable in homes where the migrant parent was the main parent and needed to do so, in such cases, releasing the guardian of this additional burden. In households where a parent (or financially responsible caregiver) still remained however this could pose a challenge. Hence looking for ways to include the collocated parent in the dynamics (if desired) could be helpful as well. For instance, in addition to the migrant parent, messages could also be transmitted to the collocated parent. Alternatively, guardians could also receive text notifications of the occurrence of a parent-teacher exchange in a similar manner to the children.

With Rivrjam, parents have teachers as additional persons to connect with about their child and to even ensure improvement in academic performance and mitigate

risky behaviors. Still there are things to consider with integrating a system of this type:

1. *Be mindful of persistent barriers:* While a system may be capable of overcoming some barriers to communication such as cost and time differences, barriers such as parental neglect or busy schedules still remain.

2. *Design to enhance parenting:* The study was too short-term to reveal whether evidence of behavioral change would occur with the introduction of the application. A neglectful parent remained neglectful and an active parent continued being so. What I saw however is how the system, if desired, could help a parent to enhance his or her parenting capabilities and effectiveness at a distance, something which Elizabeth benefited from. The system also didn't seem to replace the need for mobile phone communication with the guardian or others, but complimented it as more direct questions could be asked. It also allowed for parents to have a point of contact encouraging in-person visits to the school during subsequent trips to the home country. This goes to show that Rivrjam does not mask underlying barriers, such as distance, but provide a temporary bridge to mitigate it until the distance itself can be minimized.

3. *Design for moderate-connectivity:* One of the blessings and curse of technologies is how it continues to blur the boundaries between the home and workplace introducing hyper-connectivity. Moreover, bridging communication brings about increased trust and with that demands as well. From the logs we saw that teachers had a tendency to access the application during lunch breaks or non-working hours. Relying on teachers to know where to draw the boundaries so as to protect their time and stay within what each perceives to be his or her role is one approach. However, design could help to unblur these boundaries and set realistic expectations. For instance, showing a work/non-work status

for teachers may help parents to see the percentage of time a teacher has to spend on the system. Or looking at ways to integrate use of the application in the curriculum, such as during class when behaviors are observed, could help teachers to better manage their time.

4. *Consider the impact of parenting style on mediation:* Literature shows a connection between leadership style and parenting types. This study suggests different parenting styles may impact the way in which a system like this is used. For instance, the finding suggested possible connections between parenting styles and the response of children to receiving alerts of the parent-teacher exchange through Rivrjam. For instance a child who facilitates discussion when a notification is received possibly has a parent with a more democratic style of parenting, while children who would self-disclose their behavior to avoid confrontation or rash response by the parent may be dealing with a more autocratic parenting type.

5.7 Conclusion

Designing and deploying a collaborative IVR system in a transnational setting in spite of the challenges demonstrates the potential of technologies to cater to the needs of one type of migrant family—those undergoing parental migration with children living separated long-term from parents. Rivrjam demonstrated how, given the desire, parents can utilize the connections it brings about to enhance their parenting capabilities and improve on aspects of the parent-child communication that stand to be challenged with prolonged separation. The question this raises then is whether other migrant groups could stand to benefit from mediated communication tools. To this end, in Chapter 6, I explore the benefits of a similar asynchronous message-exchange platform within the context of refugees. Like migration-separated families, they too are embedded in an extended family support network post-migration, which requires

mediation to help make the connections.

CHAPTER VI

CHALLENGES OF MIGRATION FOR NEW REFUGEES

I continue this dissertation with an exploration into another form of migration, forced migration and resettlement. Through the lens of refugees resettling in the US, I contribute insight into how technologies can be designed to help families garner the support necessary to quickly rebuild livelihoods post-migration though facing language, literacy and cultural barriers. The resulting tool Rivrtran (with human-in-the-loop interpretation), may be applicable to migrants worldwide who move to countries that speak a language different from their own.

I begin this chapter with a discussion of the methods used the results of which give insight into forced migration and the resettlement process and the important role a community of supporters play during this period. In finding that many new refugee families do not speak English or struggle to speak it due to low confidence, in closing I outline the need for mediated communication between refugees and members of their support network. Leveraging similar IVR technology in Chapter 5, I describe the resulting prototype Rivrtran, an informal asynchronous voice-translation tool with human-in-the-loop interpretation. Rivrtran, provides translation capabilities by routing messages sent between refugees and their mentors via (unknown) volunteer interpreters. The following Chapter (7) details the 3 month deployment and evaluation of the system conducted through a local refugee Reception and Placement (R&P) organization. For reference, Table 4 summarizes the two-part study that spans this and the following chapter and its contributions.

Table 4: Study 2: Summary of Methods (Study Location: Southern State in the US)

Phase	**Method**	**Research Details**	**Contributions**
Phase 1: Formative Study	Interviews, Sustainable Livelihoods Analysis	14 participants (6 coordinators, 4 mentors, 2 professional interpreters, 2 Burmese refugees)	Carving out a nascent agenda for urban refugees through: a) providing insight into refugee resettlement and, b) identifying barriers and opportunities for improving new refugees communication capacity
Rivrtran Development/ Enhancements	Participant observation	6 month volunteer mentor; refugee family visits w/ mentors	
Phase 2: 3 month Rivrtran deployment (Refugee Agency)	Interviews (pre, mid, post)	18 participants (5 mentors, 8 refugee families (11 people), 2 interpreters)	Demonstrate use of asynchronous IVR translation tool, design guidelines
	Log and Content Analysis	Rivrtran messages, system log data	Analysis of the impact of mediated (informal) translation on the livelihood capabilities of new refugees

6.1 Methods

To uncover the challenges in the communication between mentors and new refugees, I conducted a qualitative study doing in-depth interviews and multiple occasions of participant observation. Interviews were done with 14 participants who were mentors, interpreters, paid staff members and new refugees. They worked, volunteered or were being served by local Refugee Reception and Placement (R&P) programs. These agencies support the resettlement of new refugees living in select areas in the southeastern United States. This region includes states that fall in the top ten U.S. states for the number of refugees it receives for resettlement [4]. To help answer the broader research questions outlined in Section 1.2.2 (RQ4, RQ5), I investigated the following sub-questions:.

Q1: How does communication between refugees and mentors currently occur in refugee resettlement programs for new families? What are barriers to communication?

Q2: What is the role of staff interpreters at refugee-serving agencies that provide translation services to refugees? How do they coordinate and collaborate with other staff members to provide these services?

Q3: How can technology be designed to mediate the refugee-mentor communication in ways that attempt to mitigate communication barriers?

6.1.1 Interviews and Shadowing

I conducted a mix of in-person group and individual interviews with 6 coordinators, 2 staff interpreters, 4 mentors and 2 refugees (see Table 4, Phase 1). These individuals were recruited with the help of coordinators at two agencies. Each interview lasted between 30 minutes to an hour and was done in the home or place of work of the

participant. Questions investigated the current communication practices between coordinators or volunteers with new refugee families, which helped to uncover barriers and opportunities to the refugee-mentor communication (Q1). I also gained an understanding of how the proposed Rivrtran application would fit into the activities of the interpreters and volunteer mentors who will be using it (Q2). To better understand the families' needs, I shadowed the mentors when they met with their paired families, and interviewed 2 refugee heads of household. In the interview and shadow sessions, I also discussed the concept of mediated and asynchronous communication by giving a brief demonstration of Rivrjam, the message-exchange application designed in Chapter 5. This was a starting point for discussions of if and how a similar system could be designed and adapted to fit in with their communication needs. The individuals I interviewed provided me with design ideas which I used to guide modifications, yielding the application Rivrtran (Q3). As part of doing iterative design, I consulted with these individuals for feedback as I progressed through the design process.

6.1.2 Participant Observation

In addition to doing interviews, I chose (with the permission of the agency) to do a 6-month participant observation in the role of a volunteer mentor. This began in October 2013 and continued until April 2014. The specific youth program I volunteered with connects mentors with high-school refugee girls for one-on-one mentoring. Mentors are required to meet at least once a month (over a 7 month commitment) with their mentee and conduct activities that contribute to the personal and academic success of the girl. In this position, I gained insight into the role and requirements of education mentors, the workings of a refugee-serving agency and a deeper understanding of the refugee community that it serves. Additionally, I observed other refugee family and youth focused programs such as family literacy sessions, after-school tutoring and have participated in both mentor and tutor training. I also served at a

literacy session for refugee mothers to help them learn reading and speaking skills in English. I completed a total of 25 volunteer hours and 5 observation hours. Individuals I mentored directly and their families were excluded from serving as research participants and their data were not collected or utilized in this study.

6.1.3 Data Collection and Analysis

Data I gathered during the interviews and participant observations include:

1. Audio recordings of interviews
2. Field notes and artifacts

Analysis of the data collected is two-fold. The response to interview questions and information gathered from the participant observations that were relevant to capturing the experiences of migrants were assessed using the **DFID's (Department for International Development) Sustainable Livelihoods Framework** [15]. The framework is useful for getting an understanding of the livelihoods of the poor. From this I extracted the vulnerability context and current livelihood assets of the refugee families prior to any technological intervention from this study. The framework and findings from this analysis is outlined in Section 6.2. This initial understanding will prove useful when I apply the second half of the framework to assess the impact of Rivrtran on the livelihood strategies and outcome of migrants in Chapter 7.

The second part is an **Inductive Analysis** that draws on data collected to answer Q1-Q3 outlined earlier. Data collected were transcribed (as applicable) and coded for themes following an inductive data-driven approach which identified thematic connections in the data [72]. This process yielded 93 codes which were further grouped into 10 major themes. The results of this is outlined in Section 6.3. There I discuss the themes which shed light on the refugee situation and the communication practices and barriers that exist with new refugees and their support network of case workers, mentors and others.

6.2 Results: Sustainable Livelihoods Framework

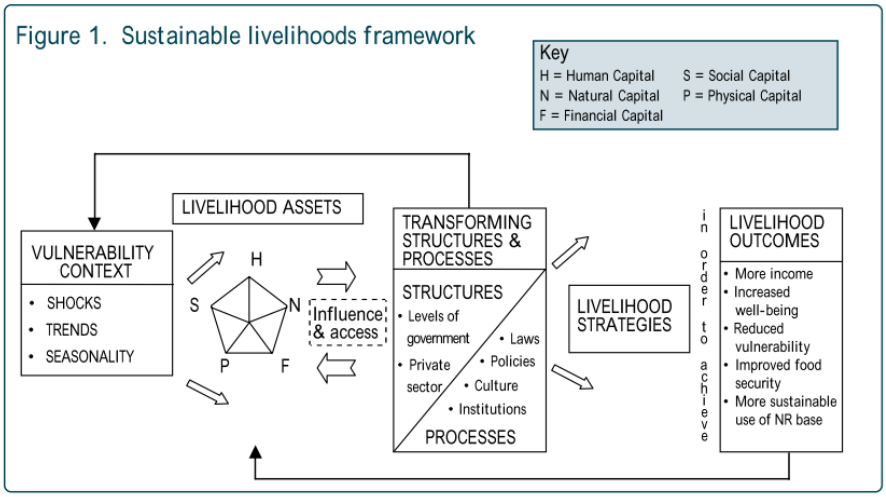

Figure 9: DFID's livelihood framework (sourced from [15])

Development is often viewed of in a macroeconomic sense. Yet improving the lives of the poor is not merely about increasing finances, but increasing the resources available to people to seek out lives and livelihoods [59]. The DFID's (Department for International Development) Sustainable Livelihoods Framework, is centered around this view point. It is a tool utilized within the international development arena to understand the livelihoods particularly of the poor and the impact or influence external structures, and vulnerability contexts have on the livelihood strategies and outcomes of economically challenged groups [15]. I apply the first sections of the livelihood framework (vulnerability context and livelihood assets) (see Fig. 9) in this chapter. In Chapter 7, I apply the latter portion of the framework (livelihood strategies and outcomes) to answer Q4 and Q5—exploring the impact of Rivrtran (the resulting technology intervention) on mediating the refugee-mentor communication and its consequent influence on livelihood outcomes for the refugees.

Using the framework I first did an analysis of the context of vulnerability—socks, socio-economic trends and seasonality that shape the lives of new refugees.

6.2.1 The Vulnerability Context of Refugees

Refugees flee their home country for fear of persecution. Many initially flee to refugee camps before applying for entry into resettlement countries. For example people of the Chin ethnicity in Burma (Myanmar) often flee to Malaysia, Thailand or India for a period of time before being granted resettlement in the United States. In our study with refugees from Burma (which is made up of different ethnic groups), our participants reported political and economic reasons that contributed to their refugee status. Those from the Chin and Karen ethnic groups also fled due to oppression given their religion and/or status as ethnic minorities. And ongoing political war contributed further reasons for forced migration for those who lived in the Chin state. Below is the result of applying the SLA framework to uncover the vulnerability context and assets of migrants prior to technology intervention.

Table 5: The Vulnerability Context of New Participant U.S. Refugees

Vulnerability	**Key Characteristics**
Political	Statelessness and refugees status (until residency is acquired in new country)
Economic	Poverty, unemployment, dependency of welfare, loss of financial assets (post exile)
Environmental	Unfamiliar environment and climate
Human	Low education levels and low English proficiency (limits employment options and access to services), high health risks, inadequate healthcare access, cultural differences, unaware of needs
Social	Separation from family, loss of social capital (post exile), prejudice
Physical	lack of infrastructure, live far from public transportation

Regardless of the reason for exile and ultimately resettlement, new refugees face vulnerabilities (beyond their control) in their new context. Table 5 summarizes these

vulnerabilities under the themes of political, economic, environmental, human, social and physical (adapted from [59]). A newcomers major vulnerability is their status as refugees. Most undergo loss of income, healthcare benefits and educational opportunities prior to arrival which makes them dependent on welfare (food stamps, Medicaid, and grants) in the new country. Those facing language and cultural barriers, as in the case of the refugees from Burma in this study, are further limited in their ability to access assets such as employment and help. They are often limited to blue collar jobs that don't require English proficiency. Some are resilient and develop coping strategies or actions to quickly overcome vulnerability.

6.2.2 Refugee Livelihood Assets

Table 6: Livelihood Assets of New Participant U.S. Refugees

Assets	**Manifestation**
Financial Capital	Earned income through employment, government or agency grants on arrival, food stamps
Human Capital	Households with more adults and adult children (labor) fair better than smaller households, English-speaking member in household highly valuable to provide translation and access to help from English-speakers
Social Capital	Burmese friends/family, church network/membership, mentors (all provide connection to employment, physical and financial assets and translation/mediation)
Physical Capital	Home ownership or apartment provide secure shelter to families, mobile phone ownership, access to computer with internet (some)
Natural Capital	Land access (e.g. ground apartments may have a small plot of land that is used for cultivation of small food crops for the household)

The second part of the framework outlines five core assets on which livelihoods are built including human, social, natural, physical and financial capital. Table 6 summarizes the assets available to the new refugee families in the study. Having fled their homeland, settling in refugee camps prior to undergoing the resettlement process in a new country, refugees often arrive in the United States with very little. They often have little to no financial or physical capital. As such, livelihood strategies focus initially on quickly converting social and human capital to financial capital. Financial capital can then be turned into physical capital (purchasing a home) or used to improve human (paying for General Education Development classes) and social capital. Human capital is in the form of employed adult members in the home is valued as this yields more income for the household cover expenses and save for the future. And having at lease one family member pursue English language and literacy training allows the family to build social capital beyond their cultural group.

Having captured the vulnerability context in which new refugees operate and the current livelihood assets, I shift to the results of the inductive analysis which sets out to answer Q1-Q3 around refugee resettlement and the role of mentors and interpreters in this process.

6.3 Results: Inductive Analysis

6.3.1 It Takes a Village to Resettle

In the first few months of arrival, new refugees need to apply for a social security number (required prior to seeking employment), identification cards or licenses. They also need to take care of any outstanding immigration requirements such as getting the proper health screening and immunizations which are required for their application for Permanent Resident Status (a.k.a the Green Card). Children of school age must be enrolled in school and some are placed in enrichment programs where they learn English, or are provided mentorship or additional academic help given many lack

of English proficiency and/or discontinued schooling while in exile. Given all that new refugees need to do on arrival, government-funded and non-profit resettlement agencies provide assistance to new refugees who arrive in the US. Agencies set the families up with a shelter and a phone. They enroll parents and any other adults in the family into appropriate English-speaking classes. Agency staff and mentors help new families with cultural orientation, integration into the new country and completing tasks that enable families to be self-sufficient. Self-sufficiency often entails helping at least one family member to secure a job and a reliable mode of transportation such as a car. On average, it takes about 3 to 6 months, with the assistance of a network of individuals, for a family to get set up. During this time they interact with well over two dozen people to get settled—doctors, case workers, mentors, educators, public workers and so on—many of whom will not speak English. However, many will face social difficulties with communication and socialization in their interactions with host nationals (stemming from language and cultural differences) that slow the resettlement process.

Families that are able to get resettled quickly are indebted to a network of people helping and past refugees who pay it forward. Past refugees who have already resettled will often provide leads to jobs. They give advice to newcomers to help them quickly acquire items like cell phones and vehicles, and get set up on communication tools like Facebook. They also help families become more aware of their needs such as tools to stay connected with family back home. Bilingual friends and families often provide translation support, and are often called on to attend school or doctor appointments with new families or mediate phone calls. Many however are too busy to do so during the weekdays as refugees tend to work long hours. (They do so to make ends meet and to pay off loans issued to them to cover transportation and medical screening costs associated with their move to the US). As such the role of mentors becomes really important.

In the specific family-matching program I describe in this study, mentors are often retirees, homemakers or self-employed individuals with a flexible enough schedule to be able to help families resettle. They are often motivated to help for a number of reasons. These include having an interest in the international community and/or experience living abroad, a desire to welcome newcomers and to contribute their time to a good cause. Given a number of refugees fled persecution because of their faith, some mentors too are motivated by faith-based reasons to help. A self-employed mentor explains, *"I've always been intrigued by what's going on internationally...So many of the quote on quote "nations" are coming to us and they need help to adapt. So many especially this family come to the US not knowing English at all. I can't imagine being dropped in China, I'm probably not going to do well without someone to help me out. So my wife and I found a group that was working with them and jumped in (Mentor 9)."* Mentors set out to help families with resettlement tasks that may not be handled by case workers at the resettlement agencies. In the study, mentors reported helping families with the following:

1. Establishing an identity (e.g. social security card or driver's license application)
2. Registering children in school
3. Learning how to access shopping facilities and public transportation
4. Arranging medical appointments and transportation
5. Connecting refugees with social services or language classes
6. Identifying and educating refugees on their needs and rights in the new country
7. Practicing English-speaking skills
8. Explaining concepts and provide assistance with applications or completing documents

9. Act as a liaison for the family when language barriers are present

10. Provide personal resources and companionship

A retired man, now a volunteer refugee mentor, who has been aiding newcomers for two years explains the help he and this network of volunteers have been able to provide to several new refugee families living in the area. *"When they first get here, we help them get their food stamps and Medicaid. We help them apply for their social security cards. We have them fill out the application or we fill it out for them. We take them to the doctor for initial medical screening and shots, immunizations. We take them to get state IDs or in one guy's case, his English was good enough so rather than getting a state ID he got a learner's permit because he passed the test. We help them look for jobs, find one and hopefully get employed. If they are people who had good English and able to get their permit, we teach them to drive. That's usually the tail end of the three months. Our fastest to get someone employed was 2 months but usually it takes us about 3 to 6 months to get somebody employed. In the first 3 months, we're doing a lot of administrative stuff—ID cards, we get a bank account and checking account set up for them (Mentor 6)."* He emphasizes the important role mentors play to those refugees who were fortunate to be in programs that offer mentor-matching. *"I really don't know how [new refugees] would get along [on their own], to even fill out a form. One family I help for instance is illiterate, they don't even know how to make their ABCs. They would not be able to go to the driver's license place or to the public health place. There is no way they would be able to fill out forms so they would have to get a [bilingual] Burmese friend to go fill out the form with them. They wouldn't know what to do."*. Mentors are also key in helping the families identify needs they don't yet know they have and assisting with fulfilling them, *"Usually I know what they need. They don't know that they need something and I'll say well you need such and such (Mentor 6)."* They will also tap into their network

to help meet those needs. This same mentor manages a mailing list of individuals from his church and the broader community who have expressed interest in sharing their resources and expertise with refugee families as the need arise, *"What I think of as my refugee team which is the group of people that sign up to be on my distribution list is probably about 100 including some non-church members like my banker or my insurance guy, people I have encountered that I've told the story to and they say oh that's really cool put me on your email list. So I have about 100 people to draw on. With that many people it has not been hard to get furniture items and so on (Mentor 6)"*. At times too, mentors use their own personal finances, *"I paid their rent one month personal, I just did it. Those first months I buy a lot of things. When you go to the electric company to open an account you have to put down a deposit, I'll pay that. When we go to the driver's licenses it also costs. The first few times at the grocery until they get their food stamp card I'll pay for the groceries, our family you know we've got sufficient funds to do that. If you didn't have that, if you were just a refugee family that came here, got put in this town, the agency is gonna work with you for 3 months but they are not gonna pay for anything beyond the grant money. You're gonna be living pretty slim I think (Mentor 6)"*.

Getting settled and gaining self-sufficiency quickly is imperative given new refugee families are supplied with just 90 days (3 months) of federal support—a one time standard amount (under $1000 as of 2015) issued per head to each family [2]. This is meant to cover rent, food, clothing and other expenses. Food stamps and Medicaid are applied for and help cover eligible food items and health insurance. Following this, many refugees continue to live on low incomes for an extended period of time. Some families receive a small match grant meant to supplement, for a few additional months, the relocation assistance they receive. This is often used to cover essentials like diapers and personal bills not covered by welfare grants. This often comes from Resettlement and Placement (R&P) programs, social justice agencies or other non-profits that work

with new refugees. Many heads of households will take on minimum-wage blue collar jobs such as working at food processing plants which do not require much English-speaking skills. Knowing some English however, yields refugees higher paying jobs at supermarkets or restaurants. With a frugal lifestyle, after a few years some families are able to rise to middle income status. One mentor explains how the family he helped did this. *"If you have two incomes which we do in a couple families and you save your money, you can live a pretty decent middle class life. The first family we got, lives frugally, keeps the apartment cool in the winter time and hot in the summer time, doesn't run their air conditioner that much, is closing on a house in three weeks. They came 4 years ago with $0 and they are gonna close on a $140,000 house (Mentor 6)"*. At the same time the mentor emphasizes that this accomplishment is also largely credited to the network of individuals that helped families during their transition, such as finding a group of people to alternate shuttling them back and forth to work when the area they lived in was not close to public transport, *"The truth is this family good for them to save their money, but they had a church backing them up. They had a church driving them to work and back when they didn't have a car, who are taking the kids. So they are not doing it by themselves. So it's good for them, but I can tell you if our church wasn't helping them, they wouldn't be buying a house (Mentor 6)"*. This story indicates the importance of social capital to new refugees who can leverage it to improve their livelihood outcomes. Without this support, outcomes are not often the same as experienced by this family. All the onus would be on the newcomer to meet all their needs on a minimum income explains the mentor, because, *"You have to be able to get to work reliably. You have to pay for child care. It cannot cost as much as what you're earning because that doesn't make any sense to pay someone $10 an hour to watch your kids while you make $9.60 (Mentor 6)"*. One mentor explains how her paired refugee family was able to acquire a job and car using their network of past refugees, *"We haven't helped with very detailed things like finding a job because*

he was able to find one really quickly through a connection that he had. And in their car buying process it was also through a connection with another Burmese friend who they met who already had a car and license so I think he explained it all to them in Burmese so it was probably easier to understand (Mentor 8)." Community and additional support was also found through the faith-based organizations that many refugees tended to join as this mentor explained, *We're not the only people to have met them. Fortunately for them there's a Burmese church here so that's really the majority of their community which is great because when there's that big a barrier to communication, how much community can you build?...I think the church he attends the pastor speaks Burmese, and I think one of his goal is to help Burmese refugee families that are here. (Mentor 9)."* These networks in addition to the mentors (though limited in the ability to help at times due to the language barrier) provided information the families needed to get up to speed. Despite this, for families who spoke other language variations or no English, a simple desire on the mentor's part to help was not sufficient when faced with communication and other barriers as discussed next.

6.3.2 Challenges for New Refugee Families

Many families face challenges that make the resettlement process tedious. And not every new refugee family is in a family-matching program with mentors who provide extensive assistance. Below are some of the challenges new refugees face that prevent them at times from receiving the assistance they need.

Unaware of 'needs': At times a family's inability to identify their needs to their mentor provided a barrier to receiving assistance. This mentor explains, *"When we took their family we thought that I would be really busy taking them places, getting them social security card and everything they needed and they haven't asked us. So a part of me think I hope I've done my part, that I've done what I was supposed to do*

because its just been hard to communicate with them. For them to know they needed that (Mentor 7).” As such, mentors have had to help families become more aware of their needs. *“I think they maybe don’t realize what they need yet because when we offer to bring something thing they might need, it would be things we might need like clothes and food. They always say they don’t need anything so I’m not sure if they know their needs yet I guess, but I can tell they need it (Mentor 7).”* One explanation I received from a past refugee from Burma (who helped with the translations) is that some, though not all refugees come out of poverty. As such they have grown accustomed to living on less or doing without things like health services or education and may not view those as needs per se, *“There are a lot of big problems for families that arrive like going to the doctors and having to have health insurance and things like that. Many don’t have anything in Burma, if you have money you go, if you don’t have money you don’t go, that’s the problem (Interpreter 3).”*

Difficulties accessing transportation: Being able to get to and from places such as work and children’s school is important. Yet some refugees are placed in residencies that while lower cost, may not provide convenient access to public transportation. A mentor explains the option for the family he helps to get to work on public transportation. *“The transit bus system in the county they live in is very small. It really only runs to the mall and their closest bus stop is about 2 miles from their apartment complex. I did a little analysis online and looked at their work schedules and it would take them—including the time to walk the 2 miles then take the bus over to the mall, then catch another bus to the train station—2 hours best case, just to get to the train station, and then wherever you wanted to go on the train would be in addition to the 2 hours (Mentor 6).”* One common solution was for refugees to obtain jobs at places where other refugees in their communities were already working so they could carpool together with those who do have personal transportation.

Busy schedules: Given many refugees take on blue collar jobs at processing

plants for instance, they work long hours during the week and even on weekends. This often makes them unable to attend language classes or go to school appointments for children. One mentor as a result fills in as a liaison during parent-teacher meetings for the parents. Another explains how his mentee had to drop out of English classes given his work schedule, *"He can't take the classes anymore for several reasons mostly because he is working and previously he was working night shift so it was crazy (Mentor 9)."* And for stay-at-home moms, they are kept busy caring for children and are not able to go to English language classes unless childcare can be found.

Language barriers: This is a major barrier to taking steps to increase one's assets such as seeking employment or learning to drive. This mentor states that, *"because of his communication problem he still doesn't have his driver's license, because I haven't been able to teach him to drive. It's just not enough understanding there. So we still provide all the transportation (Mentor 6)."* The language barrier also inadvertently results in the loss of benefits or missed appointments as refugees are not able to express themselves or their needs to those who provide services. One mentor encountered this several times with the family he helps. *"I was visiting him [at his home] when he got a call from his doctor which he immediately handed to me because he knew they were gonna speak English. And they said 'hey we had a translator here but he missed his appointment, we can't keep doing that. He's gonna have to bring his own translator in the future'. Because they are paying for the translator to be there and they are wasting their money, they won't schedule it anymore because they can't trust he'll show up. So him just missing appointments and not calling people I think is a problem. He also missed the enrollment appointment for his child because he didn't communicate that he didn't have a car, he didn't tell anybody, he just didn't go. He missed his doctor's appointment because apparently he lost his Medicaid (Mentor 9)."* As such the mentor highlights the need for the proposed application to provide mediated communication with the broader support network to overcome this, *"so if*

there is a way for him to communicate out to doctors, not just me, not just mentors but outwards to the other systems he has to deal with that would be helpful."

Given refugee agencies have limited translation support through the interpreters they hire, mentors have had to find creative ways to communicate to their paired families. One mentor explains how she used to email messages to the agency and ask for the message to be passed on to the families in their language but found this was not sustainable given the constraint her emails would have on the translator, she explains: *"The agency had an interpreter, but it's just the one interpreter. So I felt like I was bothering them to email to ask for translation help every time I felt like I couldn't communicate with this family. So I ended up just not emailing at all after that (Mentor 7)".* Instead mentors rely on hand gestures in person and for more complex things, mediated communication through friends and family if available, to try to communicate. *"We've use their pastor a few times. We'll call and get him on the speaker phone because he speaks [a language] which I guess is very close to language they speak (Mentor 6)."* Written communication has also been found useful for families that have some knowledge of the Roman alphabet. Text or Facebook messages written in short English phrases allow refugees to take their time to gather the translation through using translation tools. *"I think the benefit of the written system there is helpful because he can take the time to look at each word and he has a little app on his phone that will translate individual words from Burmese to English for him (Mentor 9)."* Others are able to understand written messages via proxy, i.e. by asking a friend to translate it. As mentors explained, this method is most suitable for sending short greetings or scheduling questions, but is not suitable for sending longer messages or explaining complex concepts. Families with an English-speaker greatly enhances the mentor's ability to understand the family's situation and goals and help to meet their needs. Yet these skills are gained only after the family has been in the country for a period of time and begins to pick up the language in the

workplace or by children at school. Hence on arrival, many families will not have English-speaking skills. Moreover, its it usually the younger children that pick up the language fastest. As such mentors use them to translate but says conversations are limited to things a young child can say. *"He'll translate now between his father and I, so if there is something more complex, that's conceptually understandable for an 8 year old, that's kind of the filter that I'm taking a lot of the conversations through (Mentor 9)."*

Mentors and coordinators highlighted the limitations of professional language lines such as those used by doctors and schools to mediate the communication. *"So when we take her to these obstetrician appointments, there is some language line the doctors subscribe to. They'll call and get a Burmese interpreter on the phone but I'm not totally sure she's understanding everything (Mentor 6)."*. Mentors also emphasize the need for local language support for refugees from countries with a vast range of local dialects such as in Burma, *"So there is over 100 languages in the country of Burma, it's very confusing. But most people will know a couple depending on who they have interactions with in their country (Mentor 6)."*

6.4 Towards a Model for Informal Asynchronous Translation w/ Human-in-the-Loop Interpretation

One of the huge barriers refugees face with communication is illiteracy in their own language. Research has shown that illiteracy in one's own language hinders the ability of an ESL speaker to grasp the English language [75], as is the case for many of the Burmese families who arrive with little to no education. Hence for many, the path to improving their English-speaking skills is quite long as they first need to become literate in their native language. Given what I've learned in the exploratory study, providing support to families on arrival is necessary. The workers and volunteers at the refugee-serving agencies who interact frequently with refugee families highlighted the language barrier as one of the main impact on the livelihood strategies of new

refugees. Many new refugees (from non-English speaking countries) also highlighted this as their biggest hurdle on arrival. The language barrier poses challenges to new families getting priority tasks done upon arrival even with the assistance of agencies and mentors in the host country. Tasks such as applying for one's social security card, registering children in school and arranging medical appointments are time-sensitive and need to be completed as soon as refugees arrive. Delays to doing these tasks limit the livelihood capabilities of refugees, and hinders the agency's efforts to help them become self-sufficient as quickly as possible.

We saw how families who were able to express their needs or expand their network outside those in poverty like themselves, received more help that got them ahead than those who did not. Agencies often rely on interpreters to mediate the communication with new families to complete some of the critical tasks. The agencies also relied heavily on volunteers, some in the capacity of mentors. As we saw, mentors were paired with new families to help them tackle tasks such as learning how to access public transportation or registering for a library card. Yet, given many do not share the language of the refugees nor have the assistance of official interpreters from the agency at hand to help them overcome the communication barrier they are less successful in helping families or understanding their needs. Along with the language barrier, communication with these families was made even more difficult during their resettlement phase since they may not have regular access to the Internet or have a stable phone number or email address.

The findings from this study fed into the design of Rivrtran (Refugee IVR Translation)—again built with the same technologies as Rivrjam web (PHP, Javascript) and using TwiML and Twilio's REST API to build the IVR (voice) component (see Figure 10). Translation support for voice and text messages exchanged was built in. This was done by storing the language preference and languages spoken by participants in the

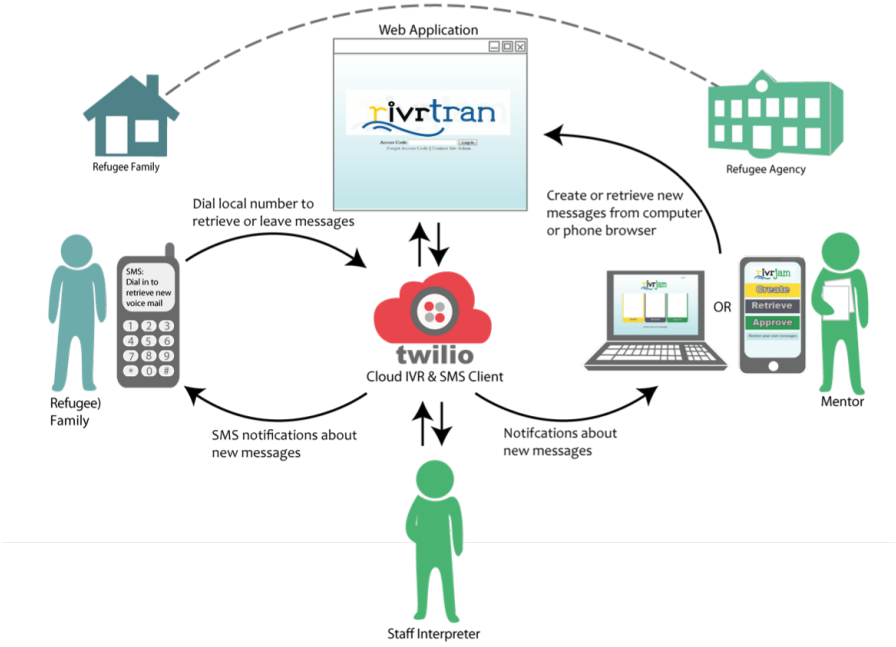

Figure 10: Rivrtran system overview

system, which it used to determine if a conversation needed mediation due to a language barrier, in which case the system would route the message to (and alert) the appropriate translator who spoke both the languages of the sender and the recipient. Users could optionally override the translation support by choosing to send a message as is. The first goal of Rivrtan was to ***mediate the refugee-mentor communication*** in an asynchronous fashion, given their communication is not currently effective due to language and time barriers. This required introducing an interpreter volunteer role where bilingual speakers could be recruited to provide human-in-the-loop interpretation for the languages and dialect spoken by the refugees. For the purpose of the study, this was limited to Burmese-speaking families. Of importance to the agency coordinators too was that the tool ***balance the dependency on interpretation***. They recommended that the application I develop be made in a way that assists refugees without removing the need or importance for families to acquire English-speaking skills. As such, the system was made a bit more ***complex by design***,

rather than making every aspect as user-friendly as possible. Prompts were issued in both English and the speaker's language, which though lengthened the time it took to go through a prompt, reinforced English learning in the process. Voice messages too were delivered in both English along with the proper translation. Hence *complexity* was a feature of the resulting design. Moreover we saw the importance of building social capital—greater access to social capital often led to a more successful resettlement for families. The application needed to be able to ***facilitate opportunities to build relationships through everyday conversations*** between refugees and those outside their 'comfort bubble' who often do not share their language or culture. The downside to using professional language lines to mediate such communication as I noted is the expense to do so. Hence a tool that sits in an asynchronous space, leveraging cheaper means of communicating would be suitable to supporting less urgent conversations such as sending greetings or daily check-ins. Additionally, ***voice was important to mitigate literacy and access challenges***. Greater emphasis had to be placed on ensuring the essential features were available via IVR for families to use by dialing in from a simple handset. This meant they would not need to log in to the application on a computer which not only required access to one but also the technical aptitude and literacy skills to function it. I explain the deployment and evaluation of Rivrtran to assess its impact on livelihood outcomes for new refugees in the next Chapter (7).

CHAPTER VII

MITIGATING LANGUAGE AND LITERACY BARRIERS: REFUGEE IVR TRANSLATION (RIVRTRAN)

Mentors assist new families with getting settled in, set up and acclimated to the new country. Interpreters provide translation services between refugee families and specific people they need contact with such as doctors and school officials. However, interpreters are not able to be present at all times or when mentors meet with their paired families. Hence many of the barriers as earlier described in 6, prevent effective refugee-mentor communication. In this chapter, I describe the 3 month deployment of Rivrtran with new refugees. This contributes one attempt to mitigate challenges such as access, language and literacy barriers to improve engagement with host nationals by newcomers.

7.1 Research Questions

To help answer the broader research questions outlined in Section 1.2.2, I investigated the following sub-questions:

Q4: What role does Rivrtran play in mediating refugee-mentor interactions to mitigate barriers to communication? What effect does it have on the mentor-mentee relationship?

Q5: What is the impact of scaffolding the refugee-mentor communication through the use of an voice translation platform on the livelihood outcomes for refugee families? Does it advance a refugee's capacity to acquire assets (human, physical, financial) and diversify livelihood strategies?

Q6: What is the experience of volunteer interpreters with providing translations via Rivrtran?

7.2 Methods

Many refugees from Burma report the lack of English-speaking proficiency as one of the biggest stressors they face [29]. This makes them an ideal candidate to benefit from mediated communication on arrival. Moreover, in 2014 refugees from Burma comprised one-fifth of refugees who arrived in the US. Given the numbers, I was able to recruit exclusively for Burmese families as an initial starting point and to limit the study to one cultural group.

I deployed the system with 9 families (see Table 7) and their corresponding mentors. I enrolled a total of 19 participants including—12 registered members from 9 Burmese families (some of whom shared mentors), 4 mentors and 3 bilingual Burmese-English speakers as volunteer interpreters. Participants were recruited from a family-matching program ran by a Resettlement and Placement agency in an urban center in a southern state in the United States. This agency is responsible for receiving refugees upon arrival in the US and helping them secure housing, public services, language skills and job training during their first 90 days of arrival. The family-matching program ran by this group, pairs newcomers with Americans (typically other families) who serve as their mentors to help with social integration and other resettlement tasks. Volunteer interpreters were recruited via word of mouth through contacts at another refugee-serving agencies in the US. All individuals were enrolled for a 12 week duration spanning February, 2015 to April, 2015. This time-frame was chosen as it is similar to the 90 day window of support new refugees typically receive on arrival. Additionally, prolonged dependency on Rivrtran was not desired by coordinators who wanted to ensure refugees still realized the importance of attaining English-speaking skills.

Table 7: Burmese Family Participants

Family	Time in US at Registration	Total in Household	# Children under 18	Number Employed	Employment Type
1	2 days	4	2	1-Dad	Laborer (Production)
2	3 months	3	1	1-Dad	Laborer (Production)
3	1 year	7	4	2-Mom,Son	Laborer (Production), Handyman
4	2 years	4	2	1-Dad	Laborer (Production)
5	4 years	3	0	3-Mom,Dad, Daughter	Laborer (Production)
6	4 years	4	2	2-Mom,Dad	Laborer (Production)
7		7	4	1-Dad	Laborer (Production)
8	1 month	3	1	1-Dad	Laborer (Production)
9	5 months	5	3	1-Dad	Laborer (Production)

7.2.1 Registration, Training and Pre-Interviews

Table 8 outlines the timeline of activities for the deployment. In the two weeks leading up to the study, I registered and conducted one-on-one training with all participants—interpreters, mentors and refugee family members. I walked both mentors and the contact person for each refugee family through registering on the system, sending and responding to messages and answered their questions (See Fig. 11).

Mentors were shown how to use both the website and phone to send and receive

Table 8: Study 2/Phase 2: Activities (Fall 2014)

Week	**Activities**
T-2	1-1 training with interpreters
T-2	1-1 training with mentors and families
Week 1	Issue list of tasks to mentors (see appendix)
Week 2	Check-in visit with al participants (usability of application): Phone or email for mentors and interpreters, and in-person visits to family members
Week 6	Midpoint semi-structured interviews: all participants Rivrtran impressions/experiences, Tasks completion to date
Week 12	End of Deployment
Week 13-14	Final interviews: all participants

messages. Refugees were shown primarily on the phone as some did not own a personal computer. The IVR voice prompts on the application were available in Burmese and English for users to follow. A Burmese-English speaking individual accompanied me to most of the tutorial sessions to further reinforce the training. For sessions he was not able to attend, he called in beforehand to give an explanation of the project in Burmese. This was sufficient to give participants an understanding of the project goals and the application. I also issued the IRB in Burmese and had the translator go through it with the participants. Each participant that registered was given a sheet with their login information and as a reminder, simple details on how use the system. Mentors were also given a guide list of tasks (see Appendix B) the purpose of which I explain next. During the training I also asked questions that helped to capture the participants' initial thoughts on or questions about Rivrtran. I also asked them to discuss how the mentor-mentee communication occurs for them if at all, and the impact language barriers has had on their adjustment in the United States.

Mentors are required by the agency to meet with mentees at least once a week. This goes on for a minimum commitment of 3 months though many (including all

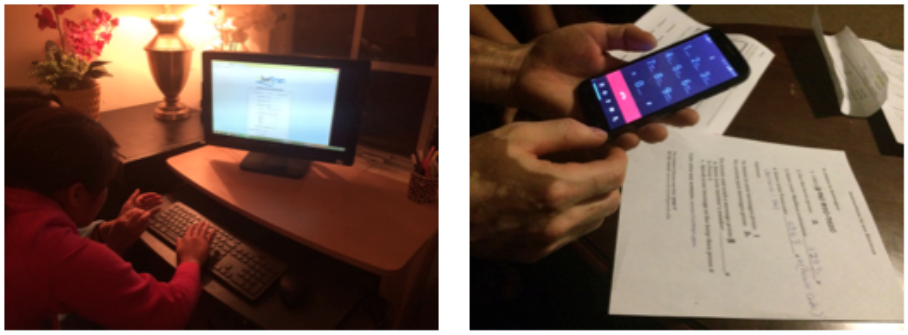

Figure 11: (a) Registering on Rivrtran web; (b) Families using Rivrtran voice

mentors in this study) continue on after that. As discussed in Chapter 6, mentors help the families accomplish any outstanding tasks they need to do that the agency has not yet assisted the family with. As our mentors state, some tasks are unfeasible or difficult to complete due to the language barriers. For the deployment, I instructed the mentors to tackle two or more of the tasks outlined on a handout they were issued (see Appendix B) and incorporate Rivrtran in their efforts to accomplish them. Alternatively they could define their own tasks (with input from the family). Along with completing the tasks, mentors were also asked to explain important concepts to their family either from the same list or again by defining their own. Tasks included registering for state issued ID cards, learning how to take public transportation and so on. Important concepts included explaining how Medicaid and health insurance works, the car buying process, building a good credit history and the like.

7.2.2 Interviews

I conducted semi-structured interviews throughout the study. At week 2, I checked in with participants to see if they had any technical challenges with Rivrtran and to capture initial impressions. At week 6, I conducted in-depth interviews with the mentors and administered the 10-question Standard Usability Scale (SUS) (see Appendix **??**) which separately captured their experience using the web application and the phone application. I also inquired about their experience with the system, the

refugee-mentor communication (Q1) and progress towards task completion (Q2). For interpreters I probed about their interactions with the system, translation workflow and recommendations for improving it (Q3). Finally, post-deployment, I interviewed all participants about their experiences, use of the system and the impact on the livelihood outcomes of the refugee families.

7.2.3 Data Collection and Analysis

Data I gathered included:

1. Audio recordings and sessions notes from the interviews and training
2. Responses to the Standard Usability Scale (SUS) issued separately for the phone and the web client to mentors and interpreters
3. Log data collected from the application (including login history, voice messages)
4. List of completed tasks with each family

I conducted log and content analysis of Rivrtran log data to understand frequency of interactions and discussion themes. Again, interview data were transcribed after which I did a thematic analysis following an inductive data-driven approach [72], with a focus on understanding the refugee-mentor interactions.

7.3 Results

Over the 12-week period 83 messages were exchanged and translated on Rivrtran. Coding the messages yielded 10 different communication topics which were discussed via the system (see Table 9): *Greetings/Wishes (16%), Health Related (7%), Academic (School Enrollment) (4%), Taxes (2%), Legal (SSN, Green Card) (7%), Future visits/trips (6%), Find out needs or status (14%), RE: Children (5%), Request for/Sending information (5%), System Related (9%)*). In addition, coding yielded 8

message types: *Introduction (4%), Informational (19%), Scheduling (16%), Question (11%), Request (10%), Acknowledgement (8%), Warning (1%), Interview (16%).*

Table 9: Rivrtran Communication Topics

Topic	**Example**
Greetings/Wishes (16%)	General greetings or wishes (e.g. Hello, Hope all is well)
Find out needs or status (14%)	Grocery shopping needs, how one is doing
System Related (9%)	Trial messages
Health Related (7%)	Doctors appointments for expectant mothers
Legal (7%)	SSN, Green Card applications
Future visits/trips (6%)	Scheduling home visits, trips to the zoo
RE: Children (5%)	Academic related, behavioral challenges
Request for/Sending information (5%)	Personal information needed to complete forms
Academic (4%)	School enrollment for children
Taxes (2%)	Explanation of tax fraud

7.3.1 Building Trust Through Phatic And Opportunistic Messaging

Thirty percent of messages sent by all individuals via the system were either in the form of phatic messages (such as greetings or wishes being sent to a recipient and their family) or check-ins on a person's needs or status. The goal phatic messaging of this was to keep the lines of communication open as this helped to build or reinforce the refugee-mentor relationship. Mentors said it helped to build or reinforce the relationship, for example one said she was not able to do this as much prior to Rivrtran given her paired family was new to the country and did not speak any English. *"Well until the website, we couldn't communicate with them at all...They have a phone so we would call and say 'we are coming'. That was the only communication we had. So since the website we were able to ask a question or how are you...I just sent them*

a couple of messages just to keep communicating...It was a huge encouragement to us that you were developing this website. I think they trust us but now we have a little bit of communication (Mentor 7).” Mentors also sent messages to check if their paired family had any needs they could help to fulfill, *“I had used it to see if they needed specific things like the grocery store or social security card and they haven't said they needed any of that (Mentor 7).”* Also scheduling of meetup times was done via the system which some mentors say was a ‘hit or miss’ activity prior to the use of Rivrtran. *“We've used it mostly to call and check in and often to arrange a time for us to come over (Mentor 8).”*

7.3.2 Diversifying Help

Messages were also well suited to explaining more advanced topics. It was used for instance to explain tax fraud and the importance of using a credible tax preparer, to conveying a doctor's message on the importance of taking prenatal vitamins to an expectant mother and so on. *“So what I have used Rivrtran for is more medical things. And we have one lady who is 7 months pregnant so there has been a number of messages from the obstetrician and gynecologist related to [various topics]...So I have used it a couple times for that, for those medical kind of messages (Mentor 6).”* One mentor emphasized that the benefit of Rivrtran to him was beyond scheduling (which he used text messaging to do) but in explaining more advanced topics like the goals of a scheduled visit and what was needed to accomplish it. *“More importantly than finding a time, because I probably could have done that with Facebook, the ways in which [Rivrtran] worked that was very helpful was to explain what we needed to do the next visit. Just to explain to him that the purpose of today is to go and sign his son up for the early start program, so we're gonna need to gather the paperwork, we're gonna need to go with him and do this interview process, just everything that's involved in that...so I left a message and it got sent and translated. He replied back yeah I'm*

ready to go, I understand it's to set him up for this class, either this day or this day will work for me and we're good (Mentor 9)." This mentor stated that he couldn't have explained this prior to Rivrtran without having to arrange for a bilingual friend of the refugee family to mediate the call or to come to the house during the mentor's visit (and whom he would have to incentivize). For more private matters, having a friend help was not a suitable option for the family.

7.3.3 Confidence Building

Mentors noted that some family members were not confident in communicating with them or practicing their English skills in person. Initially too, some were not confident in using Rivrtran. One mentor a few weeks into the study explains, *"I mean it seems like things were getting translated on time. Its just a matter of on our family's end having them feel more confident using the application (Mentor 8)."* However we saw that with continued use, the new refugees were more confident in responding and even initiating messages to their mentors. In the final interview, the same mentor reported the benefit she saw of the system in building confidence on the part of the new family, *"I think the system has helped them build social capital. We've seen them building relationships with other Burmese families in their ethnic groups, that's how the dad got the connection to his job. But communicating with an American family is outside of their comfort zone a little bit. So I'm sure Rivrtran is building their capacity to explore using other types of systems, different forms of communication and to explore different types of relationships (Mentor 8)."*

7.4 Rivrtran's Usability

Interview questions (all participants) and the Standard Usability Scale (SUS) (mentors and interpreters) captured participants' experience with the phone and/or web portal. The majority of the users reported the system as fast and convenient to use.

Accessing Rivrtran via the phone made it useful for on the go or immediate communication needs: *"I think the phone was easier and that way I could send a message back to [my mentee] right away if I was away from my house (Mentor 7)."* The web portal however provided more features like read receipt of messages which was used by some mentors to check on the status of a message—whether it had been translated and whether it had been read by the recipient. Use of the web, phone or both was a matter of the user's own communication preference. *"On the one hand the phone is more convenient because you have it with you and can do it anytime, but on the other hand I really liked on the web how you could see visually the different options for leaving a message, retrieving a message and seeing what messages you've already left and then being able to just click on the person's name rather then putting in the number for their mailbox. So I thought the web was more usable just because you didn't have to remember as many codes to put in. (Mentor 8)."*

Authentication: Authentication on the phone required using a 4-digit mailbox number and a separate 4-digit passcode to access one's account. Authentication on the web required use of one's last name and the 4-digit passcode. During training we issued a paper for users to store their codes on as reminders and to securely keep in a place of their choosing. These codes were also emailed to those who had an email address and the means to check it. Both codes were system generated (although the pin could later be changed by the user). Most users did not memorize their login information and at times did not remember the ordering in which to use the numbers. To overcome this, one of the mentors used a hack he learned on the job from having to dial in to conference calls with long access codes. He saved the number in the format: **RivtranNumber;1(for English);4-digit mailboxNumber;4-digit passcode**. This meant he could save and dial this extended number and the system would automate the prompts. This saved him from having to look up codes each time he needed to use the application. Other usability issues included unfamiliarity for the

Burmese users with certain symbols such as the 'pound sign' (#) or the asterisk 'star' sign (*). As such, they would forget to press the relevant # or * key to signify the end of a message or entry. This initially resulted in messages that were recorded but not saved by the application as the prompt to save it was not entered. We quickly resolved this following the first week of deployment by omitting the need for these key prompts to be entered.

Beyond the technical: There were non-technical situations that shaped Rivrtran usage. One mentor had a strong preference for recording voice messages on the phone versus the web as he felt it was more 'natural' to do so, *"You know its weird, I prefer the interface of the web certainly but I think subconsciously, I don't want to record my voice on the computer, I'd rather record my voice on the phone because the phone is used for communication and the computer is used for obtaining knowledge of things (Mentor 9)."*. Additionally, he stated that having to log on to the website was more outside his workflow as he is used to doing everything on his phone. In another situation, although the Rivrtran application was built to be primarily voice-based (in English and Burmese) to mitigate literacy and language challenges, the system sent a simple text notification in English to all users when a new message arrived and prompted the user to 'Call Rivrtran to retrieve the message'. This simple message posed a barrier to those unable to recognize the Roman alphabet. And due to problems with the encoding system for this language, the message could not be rendered in Burmese script. So some users did not initially know the prompts were a reminder from Rivrtran to check their voice messages, unless they asked an English-speaking person to read the message. This caused delays or in some cases the notifications were ignored. Given these users with limited literacy could still recognize names in their contact books, one workaround was to have users simply store the Rivrtran number in their contact list under a 'name' that would remind them it was a notification to check their voicemail. Some were able to store the name in their own language.

Others were trained to recognize the word 'Rivrtran' which once identified, reminded them what to do.

Necessary complexity: One mentor, who has a strong dislike of phone systems due to his background in sales described Rivrtran's usability as a necessary complexity, which he actually describes as a positive. He explains that though there could be tweaks to make it simpler to use, the simplicity may make it a crutch. *"The usability of this is fairy inelastic. Because even if its really difficult to use how else am I going to communicate to [the refugee] healthcare information, how else am I going to communicate with him I'm gonna be there and what to do with his son? There's no other real alternative...I'm still gonna use it because I have to use it. Where that becomes potentially helpful is, if its difficult to use, I will use other things if I can. This pushes [newcomers] to other systems that are more ingrained in society, more normal methods right, which require us to speak in English because I don't know Burmese, like Facebook messenger. So if he gets to the point where he can use Facebook messenger easily with me, that's a win for Rivrtran, kind of...Because the goal, at least in my use of Rivrtran as a mentor, that's a win for me because it gets him to being a competent member of society without needing the crutch of Rivrtran...It accomplishes a great goal as a policy, thinking about it from a government standpoint, if their goal is to get the adults who don't speak English into becoming productive active members of society, you can give them these things to use, but if you make Rivrtran super sleek, super easy to use, why would they ever stop using it? And then their translator is going to be translating their grocery list and their everything to everyone (Mentor 9)."*

Message delays: Interpreters responded to 57% of messages in under 30 minutes. Total turnaround time for messages took 1 to 2 days on average for messages to be responded to as it required the recipient to then listen to the message and respond. Some users described this turnaround time as 'quick'. Others thought it was lengthy for time-sensitive messages that needed responses in under a day. *"Frankly*

that's one of the things that is a hindrance to using it. If it's a scheduling thing that's time-sensitive in any way, not knowing whether you're gonna get it back today or two or three days from now is a big difference. So you kind of send it out there and it sits in the ether until it comes back. Frankly I don't know how much is delay on the translation and how much is delay on the family's response to me (Mentor 9)."

Users had input on how Rivrtran could be improved. Many desired a native app or for it's capability to be integrated with existing communication tools to make the transition to 'normal' tools easier for newcomers. For instance the sourced translations could be a back-end for the usual text messaging application. One mentor stated, *"It certainly would make some kind of a difference for usability, go to where your users are. If I don't have to change my typical workflow in order to communicate with [my mentee], of course its easier. Because like I would text you [who speaks English] and say 'hey whatever', I can text him and say 'hey whatever'. That makes it easier for him and for me certainly (Mentor 9)."*

7.5 Rivrtran Translations

The interpreters found use of Rivrtran to be straightforward. Short messages could be translated immediately after listening. Longer messages required crafting a translation and at times looking up more complex vocabulary for technical terms (e.g. medical terms). One interpreter described his process for translating longer messages *"With this system I just listen, write down what the sender is saying and then compose my interpretation and do the recording, that way I can put in all the facts. Like the other day this gentleman was talking about applying for a Green Card and he needs a lot of particulars of the Burmese side, so I had to take down all the particulars that he wanted and I compose it in the Burmese language so that a complete message is received on the Burmese side (Interpreter 3)."* This volunteer felt his workflow gave him a way to put in all the facts accurately. Interpretation styles varied as well. One

interpreter conveyed his translations in an indirect manner as one mentor describes it. *"That person [translating] is just a voice on the phone...The translator rather than directly translating as Sung, 'This pen is silver' he says what Sung said to him, 'Sung says this pen is silver'. So he telephones it a little bit. It's like this friend of ours that comes in and say 'hey Sung is saying this and he wants you to know blah blah blah. Ok bye!', click (Mentor 9)."* Another interpreter's style was to give direct translations. This difference in style was perceived by the users.

The biggest challenge for interpreters was in translating the recordings of the refugee families from Burmese to English. They reported that many of the families spoke Burmese as a second language to other local languages or dialects. This meant they had an 'accented Burmese'. Additionally, at times the messages were ill-formed or background noises (e.g. babies crying) made it hard to hear what was being recorded. This interpreter stated *"So sometimes they would just start the recording button and they don't know what they are saying and then they just stop they just drop it like that. That happened once, I could not do the translation because I couldn't catch what the guy wanted to say (Interpreter 3)."* His biggest recommendation to us was to encourage the families to first compose their responses by writing it down prior to recording their message. He felt the newness of the system and method of communicating required time and training for the refugees to build familiarity with how to appropriately record voice messages even though the technology itself was simple to use. Families did report back on the quality of translations provided by the interpreters. We got reports that one interpreter was not actually well versed in Burmese, but a variation of it, which several of the families did not understand. As a response, we replaced her with a new interpreter whom the families said they understood very well. Even with Rivrtan use and translation, there were other challenges that impacted the effectiveness of the refugee-mentor communication.

7.5.1 Beyond Translation

Cultural barriers to accessing help: Initially language seemed to be the main barrier that prevented mentors from effectively helping new families. With Rivrtran usage, we encountered cultural barriers prevented families in our study from accessing help. One mentor who has worked several years with Burmese families was already familiar with this barrier. He explains, *"They [Burmese] are pretty proud. They will tell me sometimes especially if the kids need something. Like if the kids have toothaches because they've never been to the dentist in their life the parents will let me know that. The adults tend not to say that they need things (Mentor 6)."* A newer mentor however, was not aware of this cultural challenge though she was able to identify differences from mentoring two families from different cultures, *I don't know if all Burmese families are like this, but I have a feeling they are very very sweet and kind and I don't think they expect anything. There's a difference in the Iraq family we work with. They expect nice things because they had really nice things over there [in Iraq], so they come here and have nothing. So we see that they expect a lot and our Burmese family always says they don't need anything when they have nothing...The [Iraqi family] has asked us to pay their rent, they have asked us many times for groceries...then when we go to the Burmese family you can tell they don't have much but they never ask for anything (Mentor 7).* In this situation, the mentor thought it was a communication issue so she used Rivrtran to ask if they needed things like groceries but still found, *"the family would send a message back and say no thank you (Mentor 7)."* One of the volunteer interpreter's, being Burmese himself, sensed the cultural barrier (while doing the translation between these individuals) and asked the research to tell the mentor how best to help, *"Just let that person know that the mentality of these people [individuals from Burma] is they feel very bad to ask a person for a favor. If somebody is offering them a service, that person has to say to them 'you need this' and they'll say ok, they have to accept it. Otherwise*

they feel bad to ask for a service that even the other person was offering and that is why they might say no. You know people here in America if I ask 'Do you want coffee?,' and you say no, I won't offer you a second time. In Burma, if I say 'Do you want coffee? and you say no, I say, 'Are you sure? Please! Have, have have!'. The person offering should insist. Otherwise the person who was offered, because that person feels bad they would just say no (Interpreter 3)." This revelation which we passed on to the mentor was an effective insight to her. We found other instances of cultural clarification being provided by the interpreters beyond simple translation. For instance, in the case where one mentee did not have health insurance or express a need for it, the interpreter sent a message to the mentor via the researcher that *"these new refugees have to be educated in that otherwise they won't be able to access medical care (Interpreter 3)."* Hence with the cultural clarifications from the interpreters we saw cases where help could be provided where help was initially turned down or not seen as a need.

Emotional Barriers: For some the 'transactional' feel of the system made it less suitable for having emotional conversations such as finding out the family's story. This is an open gap however, as this mentor also felt other translation options (like using a friend due to the personal nature of those conversations) were equally unsuitable. *"I think the difficulty there is that using the system feels very transactional...So having perhaps an emotional conversation about what [my mentees] wishes are and what his hopes for his family are over a voicemail is kind of a weird concept. You're not gonna have me sit down with my cup of tea and he sits down with his cup of tea in different 30 minute increments and time delayed and have a conversation right. But there is definitely a place for something like this because not every conversation can be had in person. And I don't know a better way to do it right now, it's an impossible thing without [Rivrtran] (Mentor 9)."* In this situation, Rivrtran was still the best of the available options though lack of the face-to-face limited the emotional connection one

could have.

7.6 Discussion

In Chapter 2 (Section 2.3.1) we mapped existing translation options on a quadrant based on the synchroneity of the translations—*synchronous (real-time) or asynchronous (pre-recorded, documented)*, and the formality of the translation provided—*formal* (done by a trained professional, use of formal language) or *informal* (not requiring professional training, dialects or deviation from formal language used). We see that Rivrtran sits in an informal-asynchronous space (see Figure 12). It takes on the role of what I term an ***anonymous-friend interpreter***.

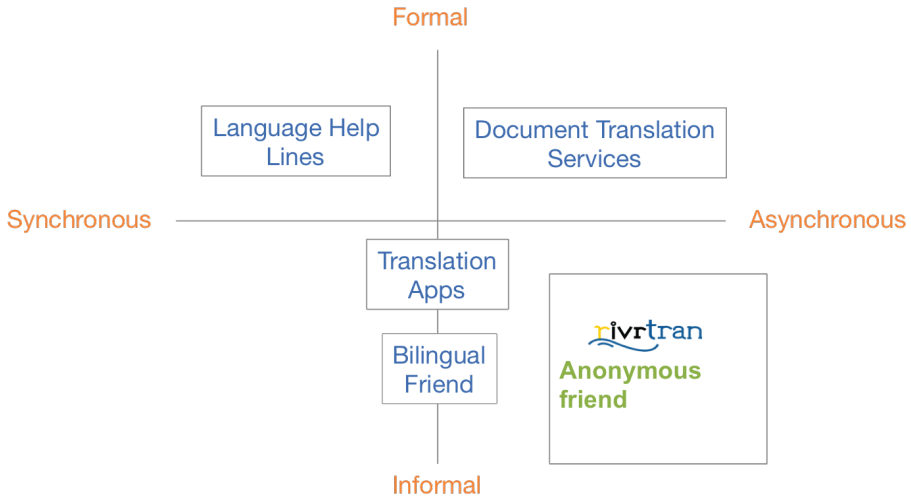

Figure 12: Quandrant mapping translation options along with Rivrtran

This anonymous-friend interpreter differs from formal translation tools given it does not require the bilingual translators to have professional training in interpretation. For users, this would result in significantly lower costs than using existing professional services. This makes the platform suitable for opportunistic messaging and daily conversations between mentor and mentee pairs. Moreover the informality allows the interpreters to provide cultural interpretation and make use of broken languages and informal dialect similar to translations provided by friends and family.

Yet unlike translation by friends or family, privacy can still be maintained given a level of separation (and limited familiarity) still exists between interpreter and users.

Still the quality of the interpretations come into question however. Yet in the study we saw how feedback provided by participants ensured the quality of interpretation being received from the volunteer interpreters. Interpreters providing sub-par services were replaced. Given most volunteer interpreters will not have formal training in interpretation, recommendation to ensure quality include providing translation guidelines, and building a rating system for users rate the quality and understanding of the translations received. Moreover we saw how a benefit derived by the volunteer interpreters was the opportunity to build their own vocabulary of technical terms. Integrating tools into the application such as bilingual dictionaries or existing translation applications, could help to enhance translation quality and provide further motivation for volunteer or crowd-sourced workers to provide interpretations.

7.6.1 Sustainable Livelihoods Analysis (Part 2)

As discussed in Chapter 6, the Sustainable Livelihoods Framework [15] can be used to understand the impact ICTs have on development initiatives through examining how an intervention affects the options and resources available to people and how they interact with them. One of the main goal of this study was to assess the impact Rivrtran had on the livelihood strategies of new refugees. As such I used the SL framework to assess the early stage impact of Rivrtran on the livelihood strategies and outcome of the participant families. In particular I used it to consider whether and if so Rivrtran has had an impact on enabling greater access to any of these assets and in doing so how it helps or not, the transformation of the assets into livelihood outcomes.

From the data gathered from interviews, observation, artifacts and content analysis of messages exchanged via the system and tracking of tasks completion, we identified which of the assets—human, social, natural, physical and financial capital were impacted by Rivrtran use, the options and resources made available to people following use and whether their interactions with these yielded livelihood outcomes. Below I identify the impact we identified Rivrtran had on the mentor-refugee relationship and/or refugees themselves and how this translated or not into new livelihood strategies and subsequently outcomes (where applicable).

Shift from missed appointments to mediated requests: We saw how missed appointments resulted in missed opportunities for refugees. Refugees often missed opportunities because they lacked the means—whether due to language or transportation—to access them. Rivrtran provided a means to mitigate the language and confidence barriers, allowing refugees to better explain their needs or request mentor's mediation to provide or source the resources needed to meet opportunities. For example, mentors provided transportation to families to doctors or school appointments, managed scheduling them and gathering the necessary paperwork. Met opportunities in turn lead to increased social and human capital (academic support for children or access to health insurance leads to better health to work) in the short and long run.

Shift from going with the flow to goal-oriented visits: Lack of understanding between mentors and refugees often meant each went with the flow. Translators were not always available to help with scheduling visits or deciding on activities to undergo during mentor-mentee visits. Though time was being invested on both ends, the return on the investment was often not as fruitful as it could be. Rivrtran provided a means for mentors to not only schedule visits but outline goals, ensuring the mentor's time was maximized and that outcomes for the families could be met. For instance mentors could explain information that needed to be gathered ahead of time

for filling out documents for various applications (e.g. social security or job applications). Time saved in this process could translate to the attainment of employment sooner (financial capital) lowering the family's vulnerability.

Shift from confusion to cultural clarification: Cultural barriers were an unexpected hindrance to providing help to some families. With refugees arriving from all over the world, understanding how best to serve each is not easy. For many mentors, the paired family is the first people of a particular culture that they are serving. We saw that even with translation, confusion in the communication could still persist. Rivrtran, as a human-in-the-loop translation platform, being supported by past refugees themselves. In our study there were a small number of interpreters. As such, users and interpreters despite the anonymity built some level of familiarity. This meant interpreters could go beyond word-for-word translation or interpretation to identifying opportunities to provide cultural clarifications and suggestions for how mentors could better help their families.

Shift from staying within one's comfort bubble to confidence with communicating: For many refugee families, the US provides a culture and custom different from their own. For many it is there first experience with a diverse group of cultures and people outside of their own. We saw how low English speaking skills and low communication confidence limited refugees from forging deeper relationships even when assigned mentors. With Rivrtran, we saw these same families begun initiating phatic communication, checking in on their mentors rather than being checked in on. These simple communication are important for trust and confidence building. The asynchronous nature of the platform also allows refugees more time and thought to respond to messages without the pressure that real-time communication brings about. This provided one step towards helping families forge relationships outside of their 'comfort zone'. A more diverse social circle yields social capital in the form of wider access to information.

Overall we see how Rivrtran (a physical capital in an of it self) was incorporated by newer families as part of their strategies to build up their assets. These assets could then be converted into livelihood outcomes to support the family whether in the short (better health leading to less sick-time and loss of wages) or long term (better employment options available to educated children). Families who had been around longer did not use it as much building a reliance more on people in their own circles however. Rivrtan allowed for assets to be diversified which in turn led to diversified strategies that better help the poor to cope with shocks. For instance, instead of building social capital with other Burmese groups, the system (through mediation and translation) helped new families build the confidence necessary to build new relationships with American families and to then leverage these relationships to seek help and mediation.

CHAPTER VIII

CONCLUSION

This thesis began with a discussion of migration and stemmed into an exploration of two such forms—parental and forced migration. I highlighted how tools can be appropriately designed to mitigate communication challenges—distance, time, language and literacy which many migrants face. I designed and demonstrated two such applications. The first was Rivrjam, an asynchronous message-exchange tool to support transnational home-school communication in migration-separated families where parents and children live apart. The second was Rivrtran, a voice-based human-in-the-loop translator for migrants (refugees in particular) facing language and literacy barriers. In both cases I saw the potential communication scaffolding through mediated tools could have on diversifying migrant's access to help, empowering them to request it of the right people. In both examples, I saw use cases where the parental capacity of a migrant parent and the livelihood strategies of newly arrived refugee families were enhanced having used the various applications. These initial findings are positive though not without their limitations.

8.1 Study Limitations

Multiple site, multi-national studies, prove costly, time-consuming, tricky and even prohibitive. One approach then would be to limit the project to focus on stakeholders located in one location—often the route many researchers take. Yet, for the study into parental migration, had I focused on just one side of the equation—for example, the care network of the children locally based in Jamaica versus migrant parents living in a foreign country—such a narrow foci would have caused me to miss out on design opportunities to better bridge the distance. For this reason I chose to conduct

a multiple site, multi-national study. This research approach however, did not come without its challenges. The result is a smaller number of participants around which the results are framed. Often a limitation of qualitative research in general, this makes it hard to generalize aspects of this findings.

Working with migrants groups posed challenges to the ***recruitment and retention of participants*** that stemmed from migration or field site logistics. First working with refugee families or children of migrant parents (most of whom are themselves waiting to migrate) meant participants could leave permanently at any point. Two enrolled families in the first study dropped out due to their children migrating shortly after the deployment had started. Additionally, access to migrant groups often require reliance on the groups that serve them. For instance I had to rely on the guidance counselors at the two schools to identify and help recruit children with migrant parents. And accessing the refugee population required working with the resettlement agencies that serve them. Working through these agencies however required time and effort to build those relationships and establish trust and understanding about the research work. I spent 6 months developing a trust relationship with one agency which agreed to host a deployment of the tool. However the agency, needing to undergo a merger with another organization which coincided with the time of my deployment, was no longer able to host it. As a result, I was not able to deploy the tool at that agency and the effort to build a relationship was lost. I had to reinvest another 6 months to build a relationship and tailor the study to fit with another refugee-serving agency prior to launching the deployment there.

Another limitation is the narrow set of methods I could employ. Methods chosen had to accommodate a range of language and literacy challenges, cognitive abilities and access to the tools to complete it (e.g. a computer for online surveys). And even with careful planning and preparation to accommodate these challenges, individuals chose what to complete or not based on what they felt was necessary and their comfort

level with doing so. I found this especially true with administering survey measures (e.g. the parent-child perceptiveness in Appendix A). Given the length and higher reading level of the survey (a tool we could not modify to preserve its validity), some did not fully complete it. Hence paucity in the data caused me to not rely on this in my results. So methods chosen for use with similar groups have to be adaptable to work with the data collected and to find ways to compensate where gaps arise. Finally, migrant families are very busy with work and the challenges of rebuilding life. This affects their level of engagement throughout the study and limits the type and length of methods that I could employ. Some remained very engaged, while others were difficult to access due to busy work schedules. Still the rich descriptions and insight this study provides is useful for those seeking to understand the gaps that exist in research around migrants and technologies and how to better help these groups. As a reflection, I underscore my attempts to shape methods and design practices to make data collection—both in-person and remote—viable.

8.2 Reflection on Methods

When methods fail: When conducting research in western contexts, we often don't realize how value-laden methods can be. For instance, interviewing is embedded with western notions of time and place as entities that can be controlled for. In working with migrant groups in the Jamaican context and with Burmese refugee groups in the US, I realized that time arrangements were not adhered to as strictly as in other groups. A scheduled appointment (such as for an interview) was at best an agreement to meet on a particular day and more loosely a particular time of day such as 'in the morning time' or 'before choir rehearsal'. Because of this, I found individual design activities and interviews move feasible to conduct than group design activities or focus groups. This required less coordination and allowed for time and place to be determined 'on the fly'. At other times I would go to locations where several target

users were—schools, large refugee communities and so on. This allowed me to work with several participants either at once, or individually. *Hence when doing research in non-western cultures, and methods seemingly 'fail' or become more difficult, reflect on whether cultural challenges may attribute to that. If so, think of ways to possibly adapt existing methods to suit the context or culture in which one's research is embedded.*

When methods intimidate: For some participants, completing design activities was daunting. They doubted their abilities and were very hesitant to draw. In this case, the researcher tried to demonstrate the process using very rudimentary 'stick-figure' sketches that helped to promote comfort among the participants. For others who still didn't want to sketch, they were told to write their ideas. And for those still very hesitant, the researcher drew sketches on their behalf from what they dictated. Though this challenge happens with participants even in research done in developed-country contexts [16], it is especially prevalent when dealing with underserved groups. *Consider ways to promote comfort and lower the perceived barriers to participation.*

Overreliance on intermeds: As I mentioned, 'intermeds' (intermediaries whom participants already trusted) were a key part of gaining access to and building trust with participants in cases where I was not able to be physically present to do so. They could also give voice to the project in the role of *champions* [37]. However, a reliance on them also meant being subjected to their schedules and being affected by any unforeseen events that may impact their availability. For instance, one of the intermeds that I worked with at one of the schools went on sick leave for two weeks. Participant recruitment could only start upon her return which delayed the project's timeline for several weeks. *Hence when working with intermeds, one has to try to find a suitable balance between keeping to a research timeline which requires making steady progress and getting individuals to complete their commitments in a timely manner. Delays are almost inevitable and one's schedule needs to have the flexibility to accommodate*

that. Moreover working with schools and organizations could mean one's field site could be closed seasonally (school summer breaks) or permanently (company closing or mergers) both of which I faced but adapted to in doing this research.

Supporting ongoing participation: Giving small incentives upfront helped to build trust at a distance or with groups not as sensitized to participating in research as those in western cultures. I found giving multiple small incentives throughout the study, following completion of major tasks (e.g. pre and post interviews), was better than doing so all at once in the end. *Distributing the incentive across the time-frame of the research, kept participants more engaged and the amount could be kept low enough to prevent the incentive itself from being a lure.*

Researcher Reflexivity: Reflexivity—reflection on the role, background and perspective of the researcher—is encouraged in in-the-wild studies (deployments in real-world contexts) [37]. This is because the different roles a researcher plays impacts on the study's outcome [65]. Johnson et. al. provide a list of some researcher roles, *champion, facilitator, technical support, explainer, strangers, colleagues/friends* showing how different roles employed for similar work could lead to different insights [37]. Hence accounting for the role researchers play in a study is important. In my studies, I played several of these roles. Given I am a native of Jamaica now-migrant young adult living the US, I shared a level of understanding with the cultural context of Jamaica. However having emigrated from Jamaica for over a decade meant a lot of things, such as the technological landscape and infrastructure, had changed. With the Burmese participants, I was more of a *stranger* initially but quickly developed a friendly relationship with participants after shadowing several mentor-mentee sessions in the homes of the refugee families. By time the deployments occurred I was perceived as a *friendly outsider or even as a friend*. One Burmese young adult male participant with whom I shared college advice given his interest in Computer Science went as far as saying, *"I don't have many American friends except for my boss, my mentor and*

you".

Figure 13: Burmese meal and gift (Kai-lan vegetable) given to researcher

Many of the Burmese participants at times also provided me with meals, bottled water or gifts (such a produce they grew) as they would to a neighbor (See Fig. 13). It also helped that I was accompanied to their homes by intermeds with whom the families were familiar. This meant participants were welcoming and willing to engage with me (and the interpreter in the case of refugees) during the study. This is in contrast to researchers who have reported the (at times) negative impact people's perception of them—as *strangers* due to the researcher's racial and cultural differences—had on participant recruitment [85]. I played the role of *technical support* in both studies, which at times meant participants would direct greetings or questions to me as well. For instance one parent asked me when school would be closed for the summer. In such cases, I had to remind them of my role as a *facilitator or technical support* but not a mentor or educator to whom those questions should be directed. My role as *friend or friendly outsider* meant people were often willing to enroll as participants. The intermeds, being from those communities themselves and due to the distance in study 1 and the language barrier in study 2 which meant I had to rely on them, took on the roles of *champions* and *explainers* of the system and the study's purpose. This meant participants did not always associate the system with me, as one I built and was evaluating (though this was initially disclosed to them) but rather as a system

that was being adopted by the organization (school or refugee center) they were associated with. As such they often perceived my role as someone hired to facilitate the registration and training process. Moreover I was not present during actual use of the application. As such we found people used the system at will and many were open (whether positive or negative) in their review of it.

8.3 Future Work

ICTs require a lot of resources for their functioning, physical (telecommunications, electrical), human (literacy) and financial (money to purchase the tools and support their functioning). Both Rivrjam and Rivrtran were built leveraging simple tools and ICTs to make the tools as accessible as possible for our migrants, many of whom as we've seen do not have access to all these assets on arrival. Those who have the physical assets may not have the finances to support their uninterrupted functioning. And those with the finances may lack the literacy skills or confidence to properly leverage these technologies as part of their livelihood strategies. The contribution of this dissertation then is a demonstration of how carefully designed ICTs can help to mitigate challenges to communication in such diverse family support networks for migrants, supporting their attainment of 'a better life' in their new locales. At the application level, future work could look at larger scale deployment of Rivrjam in a wider range of school types and sizes and over a longer deployment term. Exploring ways to integrate Rivrjam's use with the work flow of educators and including additional members of the child's care network into the communication would yield further insights. With Rivrtran, our study suggests the ability for crowds to support translation tasks. Looking into ways to scale the human-in-the-loop translation aspect such as through crowd-sourced means would be useful. Additionally, future work could look into ways to expand the contexts of use of Rivrtan. It could be utilized in health settings to facilitate scheduling and the dissemination of medical information such

as detailed explanation of illnesses and treatment options or reminders to expectant mothers. More broadly, future work could look into ways to use computer-mediated tools that attempt to overcome distance, language, literacy and other barriers to involve migrant communities in civic engagement whether in the receiving or sending country. For instance, migrant parents could be a part of shaping school rules, initiatives or even curriculum tailored to better prepare their children for examinations that are more relevant to the countries children will migrate to. And new immigrants could be encouraged on arrival to use the platform as a means of reporting issues that affect them such as poor public transportation coverage from subsidized housing areas where many reside.

8.3.1 Designing for Transient Use

In Chapter 2 I discussed related work on family awareness tools in the domestic space such as VideoProbe and Hermes@Home [36],[67] and collaborative tools in the workplace like the Time Travel Proxy [71]. These tools similar to Rivrjam and Rivrtran were asynchronous and facilitated opportunistic messaging and time-shifted communication. Yet these tools were designed to persist indefinitely forming part of users' communication strategies. In my work with migrants I saw how families were in a period of transition. The tools I developed to support them needed only persist for a period of time i.e. while parents and children remain separated, or while refugees are newcomers without basic English-speaking proficiency. I contribute then the notion of ***designing for transient use*** (alternatively, *designing for disuse*). In designing systems for transient use, the motivation is to temporarily help users overcome challenges in a way that doesn't minimize the challenge or make users dependent long-term on the technology. In essence, designing for transient use is an acknowledgement that a particular technology is not in and of itself a solution to a challenge, but rather an transitory means to a more permanent end. Compare this

notion to work in the learning sciences around instructional scaffolding in which the idea of 'fading'—i.e. the gradual removal of an instructional scaffolding put in place to help a student learn when he or she progresses to a self-regulated independent learner—is integral [3]. At times called a 'training wheel' approach, instructional scaffolding has been applied to the design of online learning environments for tasks such as helping students learn computer programming [28]. Essential elements of scaffolding include beginning with what the students can already do, helping them achieve success (to keep them motivated) and to 'fit in' with everyone else, helping learners gain independence in the activity at hand and knowing when it is time to stop offering assistance (remove the training wheels) [43]. In a similar fashion, in designing for transient use, a technology will be relevant in light of the challenge, but, if and when the challenge is tackled, the tool becomes less relevant to the user and eventually it's use is to be discontinued. This fading away is meant to help the migrants in both cases 'fit back in' with existing communication practices, rather than relying on specialized tools long-term.

In designing for transient use we can benefit from a combination of existing approaches. For instance, taking a value sensitive design approach can help to expose the values embedded in the system which should be made transparent to end users. Emphasizing the expectation of transient use, ensures that users are aware of the implications using the tools could have on them. From an interface design standpoint, introducing 'inconvenient interactions' as outlined in Chapter 2 could provide opportunities to help users overcome barriers such as literacy, language or scheduling. In Rivrtran, rather than minimizing effort on the refugee's part to check a voicemail by reducing the number of prompts they heard and playing commands in Burmese alone, prompts were repeated in both Burmese and English. This *inconvenient interaction* (since it took users longer to retrieve or create messages) provided users an opportunity to repeatedly hear and learn common English words that will be useful to

them in other settings. Taking this a step further, Rivrtran could require non-English speakers to respond using the English commands they learn through the application, to verbally navigate the system, fading away the use of Burmese prompts as they gain competence in English. In Rivrjam, an inconvenient interaction could mean requiring parents to periodically schedule and communicate with a teacher in real-time to have continued use of the asynchronous application. This would balance real-time discussions with asynchronous messaging as teachers desired.

The notion of designing for transient use would also require rethinking the metrics for success which is often measured in terms of *use* of a system. Rivrtran for refugees did not support real-time interpretation for everyday situations like other translation options (such as Speakeasy outlined earlier in related work ([31])). This meant the system would not replace the need for newcomers to learn English but would fit in where interactions were otherwise perceived impossible *without* use of the system. For this reason, in my study the system was used more by the new refugees who arrived whereas our participant families who had been in the US for 2 years, did not utilize it as frequently. Families who lived in the US longer, reported having had someone in their household who had learned English sufficient to carry out everyday simple conversations with their mentors such as scheduling or sending greetings. Additionally, given they had already achieved self-sufficiency, they did not require more complex conversations with mentors as a newcomer would. Thus ***non-use* by old-timers was a positive metric in my study as was *use* by newcomers**.

8.3.2 Conclusion

So I started out wanting to understand the challenges of migrants in transition and how technology could aid these groups through enhancing the effectiveness of their

engagement with members of their support networks. In realizing that barriers (distance, language, literacy and otherwise) prevented effective engagement with migrants, I implemented two systems for transient use. Preliminary deployments of the systems suggest opportunities that should be explored further—the use of mediated tools to scaffold communication. Though largely stemming from a case study with Elizabeth, I saw the potential for mediated tools to enhance parental competence for already active parents living separately from children. Additionally, I saw the benefits scaffolding communication could provide to new refugees; helping them develop confidence in communicating with others outside their cultural groups could help them diversify their social capital and access to help. I introduced the notion of *designing for transient use*, as in both cases the systems (as the situation of these migrants) were meant to be transitory. Future work should continue to explore and expand on the idea of designing for transient use in systems built as scaffolding, where long-term dependency on the tool is not the goal. For instance, instead of being a standalone system, Rivrtran could be integrated as a back-end to widely adopted mobile messaging platforms. In other words, looking at ways to scaffold widespread communication technologies or practices is key, so that when the scaffolding fades, users are left communicating in a manner that allows them to fit in with everyone else.

APPENDIX A

PARENT-CHILD RELATIONSHIP QUESTIONNAIRE (PCRQ)

(See next)

PARENT-CHILD RELATIONSHIP QUESTIONNAIRE (PCRQ)

W. Furman

CHILD VERSION

Instructions: Please answer all questions.

This questionnaire is about my *MOTHER FATHER (circle one)*

My name: _____ (completed by)

Hardly at All	Not Too Much	Somewhat	Very Much	EXTREMELY Much
1	2	3	4	5

1.	Some parents want their children to spend most of their time with them, while other parents want their children to spend just some of the time with them. How much does this parent want you to spend most of your time with him or her?	1	2	3	4	5
2.	How much does this parent not let you go places because he or she is afraid something will happen to you?	1	2	3	4	5
3.	How much do you and this parent care about each other?	1	2	3	4	5
4.	How much do you and this parent disagree and quarrel with each other?	1	2	3	4	5
5.	How much do you and this parent do nice things for each other?	1	2	3	4	5
6.	How much do you and this parent like the same things?	1	2	3	4	5
7.	Some parents praise and compliment their children a lot, while other parents hardly ever praise and compliment their children. How much does this parent praise and compliment you?	1	2	3	4	5
8.	How much does this parent order you around?	1	2	3	4	5
9.	How much do you and this parent tell each other everything?	1	2	3	4	5
10.	How much does this parent spank you when you misbehave?	1	2	3	4	5
11.	How much do you admire and respect this parent?	1	2	3	4	5
12.	How much does this parent admire and respect you?	1	2	3	4	5
13.	Some parents take away privileges a lot when their children misbehave, while other parents hardly ever take away privileges. How much does this parent take away your privileges when you misbehave?	1	2	3	4	5
14.	How much does this parent show you how to do things that you don't know how to do?	1	2	3	4	5
15.	How much does this parent yell at you for being bad?	1	2	3	4	5
16.	How much does this parent ask you for your opinion on things?	1	2	3	4	5
17.	How much do you and this parent go places and do things together?	1	2	3	4	5
18.	How much does this parent make you feel ashamed or guilty for not doing what you are supposed to do?	1	2	3	4	5

19. Some parents talk to their children a lot about why they're being punished, while other parents do this a little. How much does this parent talk to you about why you're being punished or not allowed to do something? 1 2 3 4 5
20. How much does this parent want you to do things with him or her rather than with other people? 1 2 3 4 5
21. How much does this parent not let you do something you want to do because he or she is afraid you might get hurt? 1 2 3 4 5
22. How much do you and this parent love each other? 1 2 3 4 5
23. How much do you and this parent get mad at and get in arguments with each other? 1 2 3 4 5
24. How much do you and this parent give each other a hand with things? 1 2 3 4 5
25. Some parents and children have a lot of things in common, while other parents and children have a little in common. How much do you and this parent have things in common? 1 2 3 4 5
26. How much does this parent tell you that you did a good job? 1 2 3 4 5
27. How much does this parent tell you what to do? 1 2 3 4 5
28. How much do you and this parent share secrets and private feelings with each other? 1 2 3 4 5
29. How much does this parent hit you when you've been bad? 1 2 3 4 5
30. How much do you feel proud of this parent? 1 2 3 4 5
31. Some parents feel really proud of their children, while other parents don't feel very proud of their children. How much does this parent feel proud of you? 1 2 3 4 5
32. How much does this parent forbid you to do something you really like to do when you've been bad? 1 2 3 4 5
33. How much does this parent help you with things you can't do by yourself? 1 2 3 4 5
34. How much does this parent nag or bug you to do things? 1 2 3 4 5
35. How much does this parent listen to your ideas before making a decision? 1 2 3 4 5
36. How much do you play around and have fun with this parent? 1 2 3 4 5
37. Some parents make their children feel bad about themselves a lot when they misbehave, while other parents do this a little. How much does this parent make you feel bad about yourself when you misbehave? 1 2 3 4 5
38. How much does this parent give you reasons for rules he or she makes for you to follow? 1 2 3 4 5
39. How much does this parent want you to be around him or her all of the time? 1 2 3 4 5
40. How much does this parent worry about you when you're not at home? 1 2 3 4 5
41. How much do you and this parent have strong feelings of affection (love) toward each other? 1 2 3 4 5
42. How much do you and this parent argue with each other? 1 2 3 4 5
43. Some parents and children do special favors for each other a lot, while other parents and children do special favors for each other a little. How much do you and this parent do special favors for each other? 1 2 3 4 5
44. How much are you and this parent alike? 1 2 3 4 5
45. How much does this parent say that he or she liked what you said? 1 2 3 4 5
46. How much does this parent make you do things? 1 2 3 4 5
47. How much do you and this parent talk to each other about things that you don't want others to know? 1 2 3 4 5
48. How much does this parent punish you by giving you a paddling when you've done something wrong? 1 2 3 4 5
49. Some children think very highly of their parent, while other children don't think so highly of their parent. How much do you think highly of this parent? 1 2 3 4 5

50. How much does this parent think highly about you? 1 2 3 4 5
51. How much does this parent punish you by sending you to your room or making you stay home? 1 2 3 4 5
52. How much does this parent teach you things that you don't know? 1 2 3 4 5
53. How much does this parent pick on you when you don't deserve it? 1 2 3 4 5
54. How much does this parent respect your opinion? 1 2 3 4 5
55. Some parents and children spend a lot of free time together, while other parents and children spend a little free time together. How much free time do you and this parent spend together? 1 2 3 4 5
56. How much does this parent let you know that other children behave better than you do? 1 2 3 4 5
57. How much does this parent give you reasons for decisions about what you can and can't do? 1 2 3 4 5

PARENT VERSION

This questionnaire was completed by *MOTHER FATHER (circle one)*

The phrase "this child" refers to: _____(completed about)

Hardly at All	Not Too Much	Somewhat	Very Much	EXTREMELY Much
1	2	3	4	5

1. Some parents want their children to spend most of their time with them, while other parents want their children to spend just some of the time with them. How much do you want this child to spend most of his/her time with you? 1 2 3 4 5
2. How much do you not let this child go places because you are afraid something will happen to him or her? 1 2 3 4 5
3. How much do you and this child care about each other? 1 2 3 4 5
4. How much do you and this child disagree and quarrel with each other? 1 2 3 4 5
5. How much do you and this child do nice things for each other? 1 2 3 4 5
6. How much do you and this child like the same things? 1 2 3 4 5
7. Some parents praise and compliment their children a lot, while other parents hardly ever praise and compliment their children. How much do you praise and compliment this child? 1 2 3 4 5
8. How much do you order this child around? 1 2 3 4 5
9. How much do you and this child tell each other everything? 1 2 3 4 5
10. How much do you spank this child when he or she misbehaves? 1 2 3 4 5
11. How much do you admire and respect this child? 1 2 3 4 5
12. How much does this child admire and respect you? 1 2 3 4 5
13. Some parents take away privileges a lot when their children misbehave, while other parents hardly ever take away privileges. How much do you take away this child's privileges when he/she misbehaves? 1 2 3 4 5
14. How much do you show this child how to do things that he or she doesn't know how to do? 1 2 3 4 5
15. How much do you yell at this child for being bad? 1 2 3 4 5
16. How much do you ask this child for his or her opinion on things? 1 2 3 4 5
17. How much do you and this child go places and do things together? 1 2 3 4 5

18. How much do you make this child feel ashamed or guilty for not doing what he or she is supposed to do? 1 2 3 4 5
19. Some parents talk to their children a lot about why they're being punished, while other parents do this a little. How much do you talk to this child about why he or she is being punished or not allowed to do something? 1 2 3 4 5
20. How much do you want this child to do things with you rather than with other people? 1 2 3 4 5
21. How much do you not let this child do something he or she wants to do because you are afraid he or she might get hurt? 1 2 3 4 5
22. How much do you and this child love each other? 1 2 3 4 5
23. How much do you and this child get mad at and get in arguments with each other? 1 2 3 4 5
24. How much do you and this child give each other a hand with things? 1 2 3 4 5
25. Some parents and children have a lot of things in common, while other parents and children have a little in common. How much do you and this child have things in common? 1 2 3 4 5
26. How much do you tell this child that he or she did a good job? 1 2 3 4 5
27. How much do you tell this child what to do? 1 2 3 4 5
28. How much do you and this child share secrets and private feelings with each other? 1 2 3 4 5
29. How much do you hit this child when he or she has been bad? 1 2 3 4 5
30. How much do you feel proud of this child? 1 2 3 4 5
31. Some children feel really proud of their parents, while other children don't feel very proud of their parents. How much does this child feel proud of you? 1 2 3 4 5
32. How much do you forbid this child to do something he or she really likes to do when he or she has been bad? 1 2 3 4 5
33. How much do you help this child with things he or she can't do by him- or herself? 1 2 3 4 5
34. How much do you nag or bug this child to do things? 1 2 3 4 5
35. How much do you listen to this child's ideas before making a decision? 1 2 3 4 5
36. How much do you play around and have fun with this child? 1 2 3 4 5
37. Some parents make their children feel bad about themselves a lot when they misbehave, while other parents do this a little. How much do you make this child feel bad about himself or herself when he or she misbehaves? 1 2 3 4 5
38. How much do you give this child reasons for rules you make for him or her to follow? 1 2 3 4 5
39. How much do you want this child to be around you all of the time? 1 2 3 4 5
40. How much do you worry about this child when he or she is not at home? 1 2 3 4 5
41. How much do you and this child have strong feelings of affection (love) toward each other? 1 2 3 4 5
42. How much do you and this child argue with each other? 1 2 3 4 5
43. Some parents and children do special favors for each other a lot, while other parents and children do special favors for each other a little. How much do you and this child do special favors for each other? 1 2 3 4 5
44. How much are you and this child alike? 1 2 3 4 5
45. How much do you tell this child you liked what he or she did? 1 2 3 4 5
46. How much do you make this child do things? 1 2 3 4 5
47. How much do you and this child talk to each other about things that you don't want others to know? 1 2 3 4 5
48. How much do you punish this child by giving him or her a paddling when he or she has done something wrong? 1 2 3 4 5

49. How much do you think highly of this child?	1	2	3	4	5
50. Some children think very highly of their parent, while other children don't think so highly of their parent. How much does this child think highly of you?	1	2	3	4	5
51. How much do you punish this child by sending him or her to his or her room making him or her stay home?	1	2	3	4	5
52. How much do you teach this child things that he or she doesn't know?	1	2	3	4	5
53. How much do you pick on this child when he or she doesn't deserve it?	1	2	3	4	5
54. How much do you respect this child's opinion?	1	2	3	4	5
55. Some parents and children spend a lot of free time together, while other parents and children spend a little free time together. How much free time do you and this child spend together?	1	2	3	4	5
56. How much do you let this child know that other children behave better than he or she does?	1	2	3	4	5
57. Some parents give their children reasons for their decisions about what they can and can't do a lot, while other parents do this a little. How much do you give this child reasons for decisions about what he or she can or can't do?	1	2	3	4	5

Scoring instructions: The full-length instrument contains 57 items; the short version includes 40 items. There are 19 subscales (see following paragraphs) and five factors (warmth/W, personal relationship/PR, disciplinary warmth/DW, power assertion/PA, possessiveness/PO). The instrument author recommends use of the longer form for those interested in specific scale scores and the briefer version for those interested in factor scores. The short form consists of the first 40 items of the 57-item questionnaire.

The scales, their constituent items, and corresponding factors for the 57-item measure are as follows: possessiveness/PO (1, 20, 39), protectiveness/PO (2, 21, 40), affection/W (3, 22, 41), quarreling/PA (4, 23, 42), prosocial/PR (5, 24, 43), similarity/PR (6, 25, 44), praise/DW (7, 26, 45), dominance/PA (8, 27, 46), intimacy/PR (9, 28, 47), physical punishment/PA (10, 29, 48), admiration of parent/W (11, 30, 49), admiration by parent/W (12, 31, 50), deprivation of privileges/PA (13, 32, 51), nurturance/PR (14, 33, 52), verbal punishment/PA (15, 34, 53), shared decision making/DW (16, 35, 54), companionship/PR (17, 36, 55), guilt induction/PA (18, 37, 56), and rationale/DW (19, 38, 57).

Scales, their constituent items, and factors for the 40-item brief version are possessiveness/PO (1, 20, 39), protectiveness/PO (2, 21, 40), affection/W (3, 22), quarreling/PA (4, 23), prosocial/PR (5, 24), similarity/PR (6, 25), praise/DW (7, 26), dominance/PA (8, 27), intimacy/PR (9, 28), physical punishment/PA (10, 29), admiration of parent/W (11, 30), admiration by parent/W (12, 31), deprivation of privileges/PA (13, 32), nurturance/PR (14, 33), verbal punishment/PA (15, 34), shared decision making/DW (16, 35), companionship/PR (17, 36), guilt induction/PA (18, 37), and rationale/DW (19, 38).

Abstract 178

APPENDIX B

RIVRTRAN LIST OF TASKS (FOR MENTORS)

A) Please select any relevant tasks to help the new family accomplish over the next 10 weeks using Rivrtran. Mark your selection below or write your own task in the line provided. You can use Rivrtran to ask the family what they would like help with.

Tasks for new families upon arrival:

1. Applying for social security card
2. Registering children in school
3. Learning how to access shopping facilities
4. Arranging medical appointments
5. Connecting refugees with needed language or social services
6. Other:

B) Please select any relevant topics to explain to the new family in the next 10 weeks using Rivrtran. Mark your selection below or write your own in the line provided. You can select as many topics below as you like. Use Rivrtran to ask what else the family would like explained to them.

Things that need to be explained to a new family:

1. How health insurance works
2. How Medicaid work vs. employee sponsored insurance
3. How to use an EBT card

4. How to register for school
5. How to get a drivers license
6. How to pass a road test
7. How to purchase a car
8. How to pay their bills
9. Online banking e.g. How to transfer money from their savings to checking
10. Other:

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