

**FROM NEEDS TO STRENGTHS: DEVISING ASSETS-BASED  
PARENT-EDUCATION ICTS FOR LATINX/A/O IMMIGRANT PARENTS IN  
THE UNITED STATES**

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The Academic Faculty

By

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PARENT-EDUCATION ICTS FOR LATINX/A/O IMMIGRANT PARENTS IN  
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## SUMMARY

International migration to higher-income countries such as the United States (U.S.) is a worldwide, growing phenomenon [1]. As the number of people moving across the world increases, so does the number of children of immigrants needing support to succeed academically [2]. While a growing number of Information and Communication Technologies (ICTs) offer parent-education support, these rarely respond to the complex reality of parents from nondominant backgrounds, such as immigrants [3, 4]. When ICTs attend to these groups, they tend to do this via patches to help these parents catch up with mainstream society. By disregarding immigrant parents' strengths and capacities—or assets—to contribute solutions to their own problems, parent-education ICTs end up perpetuating information inequities [5, 6, 7]. In response, this dissertation explores design pathways for parent-education ICTs that can best respond to the everyday information challenges of low-income immigrant parents while leveraging and augmenting their assets.

The present work pursues this goal by studying the information channels that low-income Spanish-speaking Latinx/a/o immigrant parents in the U.S.—a prevalent yet historically marginalized group in U.S. American society [8, 9, 10, 11]—use to navigate the educational system. Like most parents, Latinx/a/o immigrants must learn how to navigate an ecology of information channels connecting them with diverse actors such as teachers, digital technologies, their children, and others, to access and harness resources for supporting their children's education [12, 13]. However, Latinx/a/o immigrant parents face socioeconomic, educational, linguistic, and ethnic differences from the norm that often complicate their possibilities be part of this ecology [13, 14]. As a result, Latinx/a/o children often face a persistent low academic achievement rate.

I approach this problem through an assets-based approach to design, which has recently emerged in the field of Human-Computer Interaction as a desirable pathway for fostering technology-supported changes that build on and amplify users' strengths and capacities [3,

15, 16, 17]. Through *five* qualitative studies supported by extensive ethnographic fieldwork and Participatory Design (PD) engagements, this dissertation makes *two* critical contributions to the design of parent-education online and offline initiatives that can support immigrant families. *First*, it contributes a ground-up, holistic understanding of parents' information ecology, its actors (including technology), and their practices and challenges mobilizing assets to enable information channels for parents. *Second*, it proposes three assets-based design pathways for parent-education ICTs to support Latinx/a/o immigrant parents. *In addition*, it contributes to the growing interest in the field of HCI for pursuing a design process that prioritizes assets by demonstrating theoretical lenses and methodological commitments for identifying assets' potential to lead transformations in a large-scale system, where the diversity of actors and assets can complicate design decisions. These contributions can significantly inform future technological decisions for actors in the educational system to support immigrant families in the U.S. and beyond. Further, they can illuminate a design process for software companies and decision-makers to prioritize the voice of those traditionally unheard, thereby supporting a fairer society.

# CHAPTER 1

## INTRODUCTION

### 1.1 Research Questions

Since 2017, nearly over 165 million people have immigrated to higher-income countries [1]. Increasingly, these immigrants face the challenge of supporting their children’s education in a foreign educational system [2]. Like most parents, immigrants must learn how to navigate multiple information channels for accessing learning resources that can enrich their children’s learning experience [12, 13]. Immigrant parents often leverage many cultural and social resources to attain their information goals (e.g., asking neighbors and relatives for homework support) [13]. However, educational systems’ historical inequities position these parents’ socioeconomic, linguistic, and cultural differences as deficits [10, 14, 18], complicating their possibilities to connect with information that speaks to their contexts and interests [11, 19]. While a growing number of Information and Communication Technologies (ICTs) offer support for parents to adequately relate with the education system—including formal and informal systems in all their extension, these rarely respond to the complex reality of parents from vulnerable groups [3, 4]. When ICTs do attend to nondominant realities, they tend to treat these as exceptional cases that need patches, often disregarding vulnerable groups’ strengths and capacities—or assets—for contributing solutions [5, 6, 16, 17]. In the case of parents from vulnerable populations in the context of education, this deficit-fixing, interventionist approach can further disconnect many parents from their children’s academic lives [20, 21, 22, 23]. Extending the work done in the field of Human-Computer Interaction (HCI) with parents from nondominant backgrounds and digital technologies [3, 4, 24, 25, 26, 27], this dissertation explores different design pathways for parent-education ICTs to support low-income immigrant parents liv-

ing in higher-income countries in connecting with meaningful resources for participating in their children’s education information (e.g., learning strategies, other parents, tutoring opportunities). Specifically, this dissertation seeks to understand how parent-education ICTs working in the educational system can best respond to the everyday challenges of parents from nondominant groups, while appreciating, leveraging, and augmenting their assets.

The present work addresses this issue by studying Latinx/a/o (from now on referred to as Latin\* <sup>1</sup>) immigrant parents’ information practices in the United States (U.S.), a prevalent group historically facing social marginalization. The relationship of Latin\* parents with U.S. educational systems provides a compelling context for understanding how technology could effectively address immigrant parents’ information-related challenges. Immigrants from Latin America are the largest group of immigrants in the U.S. [8], and the second group of immigrants in the world [9]. This widespread presence is also prevalent in schools, where Latin\* students now make up for 22.7% of all students in the country [31]. Despite their predominant participation in schools, Latin\* children still face a historical and prevalent academic gap compared to their European American peers [32]. Many of the issues that lead to this gap are related to parents’ hardships in navigating a network of information that is too foreign and appears hostile to them [10, 14]. Latin\* s’ mass adoption of mobile technologies and their perception of these devices as a catalyst for learning [33] suggest ICTs could play a vital role in supporting these parents’ information goals. HCI and related fields have looked at how Latin\* use technologies as tools to navigate recent immigration [34, 35, 36, 37, 38], build communities [39, 40, 41, 42], and engage in

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<sup>1</sup>Four decades ago, the United States government mandated the use by federal agencies of the pan-ethnic terms “Hispanic” or “Latino/a” to categorize a diverse population with a variety of national backgrounds, cultures, classes, and races who trace their roots to Spanish-speaking countries [28]. The term Latinx has been recently coined in the United States as a gender-neutral category that avoids the Latino/a binary [29]. Across this research, parents, liaisons, and organization participants used the word Latino to strive for political unity in the U.S. However, following the recommendations of [30], in the rest of this dissertation, I use the term Latin\* when referring to the race-ethnicity of Spanish-speaking people of Latin American descent to elicit critical thought on the various ways people from the Latin American diaspora in the U.S. might identify. Like in computer search functions, the asterisk in Latin\* signifies options. Thus, it seeks to be a term for recognizing the multiple forms of self-identification that people of Latin American origins might use to highlight their intersecting identities and experiences.

information-seeking/co-learning activities with their children [43, 44, 45]. Less is known about these parents' experiences outside of the school or home environment. That is, how they interact with large and complex educational systems around them to access, interpret, and apply information for ensuring their children's academic success. Further, there are very few design initiatives for this population [3] that recognize and leverage their talents, skills, capacities, cultural and social capital—or assets [46].

This dissertation pursues an assets-based approach to design as a path to attain technology-supported changes that build and amplify users' strengths. Inspired by established work in the fields of Education and Community Development [19, 47, 48, 49], a body of HCI researchers has increasingly championed this approach as an alternative to the traditional needs-finding and needs-fixing view of technology design [3, 15, 16, 17]. While designing for users' "haves" can promote autonomy and lead to sustained impact, the field of HCI has yet to explore how to use assets effectively in design [50, 51, 52, 53]. Drawing on cultural studies [54, 55], this dissertation grapples with that pending issue by focusing not on assets only but assets in action. That is, analyzing the problem-solving goals that individuals pursue in using a particular asset, and from there, determining how design can feasibly redirect that asset for another, desirable goal. This view of assets-based design, together with ethnographic and Participatory Design (PD) methods, allow this work to examine the following research questions about re-envisioning parent-education ICTs for Latin\* immigrant parents as they navigate the large-scale educational system:

- *RQ1* What are the actors in the educational system—including formal and informal systems as well as all the actors at the periphery of those systems—shaping information channels that can benefit Spanish-speaking low-income Latin\* immigrant parents?
- *RQ2* How do these actors mobilize their assets and interact with other actors' assets to build and maintain information channels that can enhance opportunities for Spanish-speaking low-income Latin\* immigrant parents to support their children?



- *RQ3* What assets-based design pathways for parent-education ICTs do these diverse actors see as feasible and desirable to prioritize and augment the assets of Spanish-speaking low-income Latin\* immigrant parents?

This dissertation explores these questions across two phases of research and design, each drawing from different theoretical and methodological supports. Via three studies (S1, S2, and S3) and drawing from Science and Technology Studies (STS) perspectives of socio-technical systems as lenses for analyzing assets in action, *the first phase* (See Chapter 4) demonstrates a systemic, ecological approach to understanding parents. It offers an in-depth understanding of how, why, and to what degree of success actors mobilize their assets to support information channels that benefit parents. Study 1 explored the degree of freedom that existing parent-education information channels give to parents nationwide when needing to mobilize their assets for attaining parenting and information goals (S1 - see Section 4.1). The second study examined how multiple systemic actors mobilize and negotiate their assets to shape information channels that can serve low-income Spanish-speaking Latin\* immigrant parents, specifically (S2 - see Section 4.2)). The third study (S3 - see Section 4.3)) zoomed into the work of bilingual parent-education liaisons, who transform gaps and differences between actors into assets for creating information channels that benefit parents.

Using the insights from the first phase as input, *the second phase* (See Chapter 5) build on Paulo Freire's concept of conscientization and Anne Swidler's theory of culture in action to explore a bottom-up, participatory perspective of assets-based design. First, this phase worked with parents in identifying and designing with assets (S4 - see Section 5.1)). Then, it transferred the learnings from that endeavor into PD work with institutional actors in the educational system (S5 - see Section 5.2)) envisioning how to support parent-education ICTs that prioritize parents' assets, practices, and aspirations. Table 1.1 (below) summarizes these phases, their studies, and the research questions they respond to in connection to the larger issues this dissertation explores.

In exploring these questions, this work contributes to two areas of work in HCI research. First, focusing on the case of low-income Latin\* parents, it advances current knowledge on the complex, technology-supported collaborative work that parents from nondominant groups perform with multiple systemic actors to support their children. In particular, it demonstrates the relevance for parents and technology studies to go beyond the parent-child and parent-teacher dyad and into dissecting the multiple spaces where parents participate, gathering the perspectives from actors with whom parents interact. In doing so, this dissertation also illuminates design and research pathways that, while not generalizable, can be transferred to other groups of parents from nondominant backgrounds in the U.S. and beyond. Second, it offers a set of analytical approaches and methodological considerations for conducting an assets-based design process that supports actors of a large-scale system envisioning how to use their assets in design while still prioritizing the voices and assets of the most vulnerable. The way the pandemic crisis impacted systems like education highlights the value of this contribution. Now that many systems failed, we can clearly see the many gaps that existing technologies create for people navigating information channels in large-scale systems. As such, the need for tools that can guide software companies and decision-makers towards technology design that supports a fairer society is more apparent than ever.

Table 1.1: Summary of studies, timeline, research questions, and relation with dissertation’s research questions

Study	Dates	Data Sources	Study’s Research Questions	Dissertation’s Research Questions
The Assets-Based Support of Parent-Education Information Channels in the U.S.	Aug - Dec 2016	Semi-structured interviews, non-participant online observation	<p>(1) What are the different online and offline spaces that parents in the U.S. use as information channels to support their children’s education?</p> <p>(2) How are technology-mediated communication spaces enabling parents and school actors to mobilize their different assets for accessing information that supports children’s education?</p> <p>(3) What are the opportunities and challenges for parent-education ICTs to support spaces where parents and others actors can mobilize their assets to facilitate access to information for supporting children’s education?</p>	RQ2, RQ3
Parent-Education Information Channels for Latin* Immigrant Parents: A Complex Story of Many Assets and Actors	Jan 2017 - May 2018	Semi-structured interviews, informal conversations, and participant non-participant observation	<p>(1) What are the human and non-human actors mobilizing their assets to shape information channels for low-income, Spanish-speaking Latin* immigrant parents in the U.S.?</p> <p>(2) How do actors in the context of low-income, Spanish-speaking Latin* immigrant parents in the U.S. align their assets to enable information channels that benefit parents?</p> <p>(3) What are the challenges and opportunities for parent-education ICTs to align with and amplify actors’ assets as they support information channels for low-income, Spanish-speaking Latin* immigrant parents in the U.S.?</p>	RQ1, RQ2, RQ3

Table 1.1 . . . continued

Study	Dates	Data Sources	Study's Research Questions	Dissertation's Research Questions
<p>Parent-Education Liaisons: Critical Assets-Aligners Enabling Information Channels for Latin* Immigrant Parents</p>	<p>Jan - Mar 2019</p>	<p>Semi-structured interviews informal conversations participant non-participant observation</p>	<p>(1) What parent-education information services bilingual parent-education liaisons offer by aligning the assets of multiple actors supporting Latin* immigrant parents in the U.S.? (2) What are key resources enabling the assets-aligning, information work of bilingual parent-education liaisons supporting Latin* immigrant parents in the U.S.? (3) What are the opportunities and challenges for parent-education ICTs to amplify the assets-aligning, information work of bilingual parent-education liaisons supporting Latin* immigrant parents in the U.S.?</p>	<p>RQ1, RQ2, RQ3</p>
<p>Working with Parents in Envisioning Asset-based Pathways to Design</p>	<p>July 2019</p>	<p>Participatory Design</p>	<p>(1) What assets do Latin* parents identify having for finding, accessing, and making sense of information for protecting their families? (2) How do Latin* parents envision leveraging their assets towards the better parent-education information channels? (3) What opportunities and challenges do Latin* parents' assets-based visions for future information channels suggest for assets-based parent-education ICTs?</p>	<p>RQ3</p>
<p>Working with Mediators in Iterating on Parents' Assets-Based Pathways to Design</p>	<p>Nov 2019 - March 2020</p>	<p>Participatory Design</p>	<p>(1) How does the knowledge of Latin* immigrant parents' assets and visions of the future impact bilingual parent-education liaisons' insights on parents' information problems and potential interventions to the educational system? (2) What are the assets-based design pathways for parent-education ICTs that different groups of bilingual parent-education liaisons progressively propose to support low-income Spanish-speaking Latin* immigrants in the U.S.?</p>	<p>RQ3</p>

## 1.2 Significance of the Study

As the ubiquity of ICTs extends to both formal and informal learning environments, there is a pressing demand for all parents to effectively leverage technology and information for their children's benefit [12, 56]. However, normalizing technological skills as a parenting requirement runs the risk of perpetuating information struggles for immigrant families and families from other non-dominant backgrounds. If ICTs impose skills that disregard parents' strengths and capacities—or assets—for supporting their children, they can end up hindering parents' and children's opportunities for working towards desirable futures. The design of ICTs that support immigrant parents as they engage with their children's learning, thus, acquires critical relevance: designers, authorities, staff, and community partners at educational systems need to work towards the creation and selection of parent-education ICTs that stem from a rich understanding of parents' assets, leveraging these assets to support parents' and children's aspirations and goals.

This dissertation's findings offer two critical opportunities to impact the current role of parent-education ICTs for immigrant families. First, it contributes a rich analysis of the multiple assets operating in the educational system for benefiting Latin\* immigrant parents' information access. Second, from this analysis, this dissertation describes concrete assets-based design pathways for parent-education technologies to support Latin\* immigrant parents. By demonstrating an assets-based design process tackling the large-scale educational system, this dissertation also has significance for software designers and researchers exploring how to work with communities to impact large, public systems serving vulnerable groups.

### 1.2.1 Latin\* Immigrant Parents and Information Channels: An Assets-Based Analysis

Many actors in across formal and informal learning spaces often assume that immigrant parents and their parenting, information, and technology practices are deficient [13, 14,

57, 58]. They tend to read immigrants' linguistic, cultural, and educational differences as disadvantages only, ignoring how differences can act as strengths for supporting rich, locally-situated information management opportunities. Thus, there is a dearth of initiatives, technological and non-technological, that leverage immigrant parents as a resource for supporting children's education [3, 59]. This dissertation contributes a first step towards shedding light on information-based initiatives that leverage differences as strengths—or assets. Specifically, it illuminates three aspects of how parents and other system actors mobilize their assets to create and maintain parent-education information channels.

First, the findings of Study 1 (see Section 4.1) shed light on the limitations that current parent-education information channels nationwide impose on parents and other actors for effectively mobilizing their assets towards sharing learning resources. These findings can inform school authorities and staff as they decide what parent-education ICTs to promote at their institutions. Further, they can support designers of parent-education ICTs as they envision future pathways for their products and possibilities to intervene in schools.

Second, the findings of Studies 2 (see Section 4.2) and 3 (see Section 4.3) illuminate the relevance of exploring how assets relate to parents' information channels from an ecological, systemic perspective. Existing parent-education ICTs tend to only focus on reinforcing the parent-child and parent-teacher interaction. In disregarding parents' experiences outside of those to contexts, they promote patching solutions that address immediate needs and disregard systemic issues preventing long-term social change [60, 61]. Studies 2 and 3 provide a rather holistic understanding of how parents and many other actors mobilize their assets to create, maintain, and navigate multiple parent-education information channels. As such, it unearths a series of often-invisible mechanisms that software design and educational organizations can harness to devise technological interventions for supporting parents' information practices and aspirations.

Third, Studies 4 (see Section 5.1) and 5 (see Section 5.2) provide a rich account how community-based, assets-based design insights can travel bottom up, exploring feasible

support from institutional actors. Across educational systems, authorities tend to make decisions about ICTs without considering parents from non-dominant backgrounds as partners in the process [62]. Study 4 explores an assets-based PD process that engages parents in identifying their assets, imagining how to leverage them for ensuring effective parent-education information channels. Study 5 transfers those insights to institutional actors and works in a PD engagement with them to support parents' assets and visions for the future. These studies' results can inform school staff and community partners supporting immigrant families; such a rich community-based view of assets can spark reflections and conversations on possibilities to make their practice assets-based ones.

To conclude, all four studies demystify different actors' deficit-based beliefs of Latin\* parents' engagement and information practices. Also, they enrich discussions over possible trajectories for contending with such a large social problem, including actions at the school district level to improve systemic information practices when addressing the needs of families from non-dominant groups. Finally, this ecological, systemic perspective of assets can inform the work of technology designers and researchers that, by exploring the multiple spaces of where education and immigration intersect, are actively working towards long-term changes for immigrant communities.

### 1.2.2 Latin\* Immigrant Parents and Parent-Education ICTs: Assets-Based Design Pathways

While the work on digital inequities has explored the how existing technologies are promoting the learning experience of the Latin\* parent-child dyad [25, 43, 63, 64], there are fewer design initiatives that support parents' information practices and aspirations [3]. Stemming from a deficits-based perspective, most commercial products working at schools treat parents from nondominant groups as an exception to a norm and provide patches to help them catch up [21, 23, 65, 66]. A continuing challenge for ICTs that support parents from non-dominant groups is to recognize, leverage, and amplify the strengths and capacities—or assets—they mobilize to support their children's academic endeavors [10, 14, 57, 58, 67,

68]. This dissertation demonstrates a process that progressively, first from a top-down and then in a bottom-up perspective, enriches the understanding of possible design pathways for assets-based parent-education ICTs.

Study 1 leveraged a nationwide inquiry to offer design guidelines for parent-education ICTs to be intelligent spaces where parents and other actors could better act on their assets to attain their different parenting and information-management goals. Beyond informing design opportunities for software designers seeking to intervene in educational contexts responsibly, these guidelines are a critical tool for decision-makers in the educational system to assess their technological decisions. Studies 2, 3, 4, and 5 devoted ethnographic and PD efforts to iteratively revise how knowledge about the complex reality of Latin\* immigrant parents relate, deviate, and ultimately can enrich the initially proposed guidelines.

Stemming from parents, community partners, and school staff's visions, the proposed pathways address three critical issues limiting assets-based initiatives.

- The information fragmentation that the diversity of parent-education ICTs end up creating for parents.
- Institutional ICTs decisions that position parents as information receivers, preventing parents from freely connecting with information and human actors.
- The emphasis that information channels put in school-related information that is often not meaningful to parents.

By tackling these issues in ways that parents identify as desirable and other actors consider feasible, these pathways offer options for community partners, school actors, and software companies to come together to contend with such a thorny social issue.



### 1.2.3 Assets-Based Design and Large-scale Systems:

#### An Analytical Approach and Methodological Considerations

To address issues of equity and inclusion, a growing amount of work in HCI has explored the design of technology-based interventions that can support social transformations, especially in situations where financial, emotional, and social resources are scarce [5, 60, 69, 70, 71, 72]. Progressively, democratic approaches such as PD and Action Research [73, 74], design orientations [61], and discussions on how to design from an in-depth understanding of human behavior such as values and aspirations [75, 76], have expanded conversations on how design could work towards social change. Increasingly, HCI scholars have stressed that these design perspectives need to consider users' strengths or assets as critical for ensuring a design process that acknowledges and puts human dignity at the center [3, 6, 16, 17, 70]. Although work in the field of Education and Community Development has long worked on expanding assets-based visions of change [19, 48, 49, 77, 78], in HCI, an assets-based approach to design is still in development. Emerging research on the topic has suggested that designing from assets raises critical issues for HCI to explore [52, 53]. For example, it is unclear what can be considered an asset and by whom. Further, how can a designer or researcher identify and make sense of all the assets working in a large-scale system? Also, whose assets should the design process consider?

This dissertation contributes to this emergent need by starting from a working definition of assets based on cultural studies of human action. From there, it demonstrates a design process for identifying such assets and analyzing their potential for supporting design initiatives that can lead towards social transformation. In particular, using views from education and lenses from STS, the Study 2 to 4 demonstrate a top-down, multi-perspective approach for analyzing the design potential of assets in a large-scale system to support community-based practices and aspirations. The last two studies then contribute methodological considerations, challenges, and navigational strategies for conducting bottom-up assets-based PD that prioritizes those most vulnerable.

By demonstrating one operationalizable approach to assets-based design that values vulnerable groups' voices and aspirations, this dissertation shows designers, communities, and system actors to appreciate the diversity of assets while acknowledging and managing power differences. Further, it offers analytical and methodological tools for facing the complexity of how assets operate in a system and their possibilities to support technological changes.

### **1.3 Overview of Proposal**

The rest of the proposal is organized as follows.

Chapter 2 describes the research context, reviewing how Latin\* immigrant parents' have historically related with U.S. American educational systems and the initiatives that exist to support these parents further. This chapter also positions this dissertation within research on immigrants' information and technology practices, ICTs' existing support for immigrant parents, and current trends in the design of parent-education ICTs.

Chapter 3 describes theoretical and methodological approaches guiding this dissertation. First, it details the view of parental engagement—and thus, of parents' information practices—that this dissertation follows, which sees it as a relational, dynamic activity between parents and an ecology of many actors. Further, based on a review of assets-based design work in HCI and of existing assets-based work in the fields of Sociology, Education, and Sustainable Development, this chapter describes this dissertations' working definition of assets as cultural capacities and of assets-based design as a process of concientization on assets and systems.

Chapter 4 details the first phase of this dissertation, which leverages interviews with parents across the nation and a 2.5-year multi-sited ethnographic fieldwork to identify assets—or cultural capacities—and their interactions, alignments, and misalignments in relationship with information channels for parents at an ecological level. Specifically, this chapter describes three qualitative inquiries, demonstrating the theoretical lenses that sup-

ported a systemic analysis of capacities. Drawing on the concept of spaces in an ecology of parental engagement, Study 1 (see Section 4.1) explored how information channels nationwide allow parents from different socio-economic backgrounds to mobilize their assets to support children's education. Focusing on Latin\* immigrant parents in Atlanta, Georgia, Study 2 (see Section 4.2) draws inspiration on Actor-Network Theory (ANT) to unpack how parents and many other supporting actors align their assets to establish effective information channels. Borrowing from Vertesi's analytical language of seams, Study 3 (see Section 4.3) expanded this systemic understanding by exploring the information and technology practices of those specific actors whose work aligns assets for crafting and maintaining information channels that support Latin\* families.

Chapter 5 describes the second phase of the dissertation, which undertook two assets-based PD engagements to support actors in the large, educational system in reflecting on their capacities for navigating the educational system, and envisioning assets-based parent-education ICTs. Study 4 (see Section 5.1) entailed a one-month engagement with Latin\* immigrant parents across the city of Atlanta. Study 5 (see Section 5.2) describes four PD workshops that, using parents' insights and aspirations, engaged different educational actors in imagining feasible changes to the educational system's information channels. As a whole, these chapters shed light on how to conduct assets-based PD community engagements as a process of critical reflection, which pursues incremental actions towards social transformation.

Chapter 6 offers a reflection on this dissertation approach to analyzing assets in a large-scale system from the top down, and the methodological considerations it offers to assets-based PD. First, it discusses the research and design implications of pursuing an assets-based design process that no longer sees assets as positive, static traits but as cultural capacities that people mobilize to get by in the world. Second, it explores the advantages and tensions of analyzing how multiple actors' capacities can inform technology design. Finally, it details a set of methodological values and commitments guiding this dissertations'

assets-based PD engagements.

Chapter 7 concludes this work with a summary of the contributions this work provides to the field of HCI and a reflection on this work's limitations and goals for the future.

## CHAPTER 2

### RESEARCH CONTEXT AND RELATED WORK

In this chapter I provide a through description of the relationship between Latin\* immigrant parents and the U.S. educational system, including their relationship with technology. Then, I situate this dissertation in the existing understanding of how immigrants related to parent-education technologies and the design of this technologies to better serve parents from nondominant backgrounds.

#### **2.1 Research Context: Latin\* Immigrant Parents and Education**

In this section, I describe Latin\* immigrant families' historical relationship with schools in regards to children's education and the role of culture in shaping it. From there, I offer an overview of institutional initiatives attempting to help Latin\* children via supporting their parents' connection with the educational system. Finally, I describe how digital technologies have further shaped possibilities for Latin\* parents to engage with their children's education.

##### 2.1.1 Latin\* Immigration and Schools: A Cultural-Historical Perspective

Latin Americans (also known as Latinos, Hispanics, and Latinx, see footnote in Introduction) make up more than 18% of the U.S. population [8] and the 25% of school children [32]. Further, by 2050, they will become a third of the U.S. population [79]. Despite their significant presence and their relevant role in the country ever since its early beginnings, Latin\* immigrants have historically struggled with marginalization in the U.S. American educational system [80]. For centuries, American schools made no effort to serve the needs of Latin\* immigrant families. Marginalization practices ranged from segregating Latin\* from white children on the basis of not being at the right linguistic and moral level, to fail-

ing to provide schools with Spanish-speaking teachers and staff. Further, the system put the blame on Latin\* immigrant parents, whose ample differences from the norm suggested that formal education was not their priority [81, 82, 83]. Such deficit-based views, together with many other intersecting factors (e.g., cultural gaps and the risks of undocumented immigration) heavily hindered parents' ability to access information for supporting their children, thereby feeding into an ever-growing achievement gap [84].

Despite holding different practices for engaging in their children's academic life, research has consistently demonstrated that immigrant parents do place a high value on the education of their children [57, 67, 85, 86, 87]. In the case of Latin\* parents, the cornerstone of their support is moral guidance realized in the form of "consejos" (nurturing advice) and stories of "sacrificio" (sacrifice) to motivate their children educationally [13, 57, 82]. Other types of support include finding children a quiet workplace in overcrowded homes, excusing children from chores to do schoolwork, and making financial sacrifices [10]. Because these forms of parental involvement are primarily cultural and happen mostly at home and in languages different from English, they are largely invisible to teachers and administrators in American schools [13].

The parental involvement practices that lead to children's success in U.S. educational systems, however, are heavily based on fostering concerted cultivation; that is, a "deliberate and sustained effort to stimulate children's development and to cultivate their cognitive and social skills" [88]. To engage in such a cultivation, parents are expected to manage resources for facilitating empowering activities that can motivate children to express themselves as well as to monitor their children's educational efforts at school and beyond [12, 56]. For Latin\* immigrant parents, such practices are not only foreign, but entail daunting information-related tasks (e.g., developing new understandings of the world, connecting to new social networks, and acquiring new forms cultural capital). Intersecting challenges in the life of Latin\* immigrants such as having to work long hours, experiencing stress due to social isolation, and limited familiarity with English, all complicate these parents' ability

to manage the information demands of parenting in the U.S. [13, 14].

### 2.1.2 The Nature and Range of Initiatives Supporting Latin\* Children and their Parents

Showing a lack of understanding of the cultural and structural issues of immigrant parents, for many years the U.S. educational system did very little to help parents overcome issues of information access related to children's education [81, 82, 83]. The rapid growth of Latin\* students in recent decades, however, has slowly pushed both formal and informal educational systems towards rethinking their relationship with Latin\* immigrants. This has produced different interventions for helping Latin\* immigrants to catch up and connect to systems that are generally foreign to them. Federal programs like Title III, for example, enables schools to hire staff that can become language and cultural liaisons between parents, schools, and beyond [89, 90]. By operating in between different social and technological systems, these liaisons can make sure teachers, school staff, parents, and other actors can access and make sense of information for working together towards the benefit of Latin\* families. These actors are then in a position where they could educate teachers and administrators about parents' cultural realities and empower parents to become advocates for themselves and their children.

Cognizant of the need to support the information needs of Latin\* immigrant parents, other educational actors, such as programs for children or parents, and religious organizations also work to offer services that connect immigrant parents with different information networks. Organizations like the Latin American Association and Ser Familia in Georgia, Casa Latina in Washington, and UnidosUS across the United States, for example, put forward programs such as English classes, parenting workshops, and academic mentoring for children. In recent years there has also been an increase of after-school programs targeting Latin\* children only; over 3.8 million Latin\* children of immigrants are signed up in these programs across the US, and 5.5 million are waiting to get in . A vast majority of Latin\* parents tend to see these programs as beneficial for their children' present and future; by

attending, children can better harness learning opportunities [91]. These programs usually also target parents, teaching them how to access parenting-related information across topics that are vital for advancing their families (e.g., finance, health, nutrition, and education).

### 2.1.3 The Role of Digital Technologies in Shaping Latin\* Families' Relationship with Education

The fast growth of technologies' presence in our lives has also impacted the relationship between Latin\* parents and their children's education. U.S. schools, specifically, have gradually migrated their communication with parents from paper to digital, and are constantly motivating parents and children to use technology for fostering home learning [22, 92, 93, 94]. Tools such as emails and SMS enable schools to keep parents regularly aware of institutional information [95, 96]. Platforms like Parent Portal and Home Access allow parents to learn information such as grades, homework assignments, and academic problems [97, 98]. Other platforms, like ClassDojo, inform parents about their children's behavior [99]. In addition, teachers promote many other tools like Dreambox, ABCYA, RAZ-Kids, and such, for children to use at home to supplement the content covered in class [100]. All of these digital options, however, tend to reinforce a one-directional model of communication, where information travels from schools to parents, and parents have no mechanisms to let schools know if this information interests them, or if it makes sense to them [93, 94]. Moreover, these technologies are usually designed to support the practices of mainstream U.S. parents; that is, fostering a constant communication with teachers to monitor children's education as much as possible [56].

Latin\* immigrant parents are highly familiar with the use of technology: they own smartphones, go online from a mobile device, and use social networking sites at similar—and sometimes higher—rates than other groups in the U.S. [33]. Further, many of them consider these technologies as critical catalysts for learning, both for themselves and for their children [33, 101]. However, these parents' relationship with technology-disseminated



school information is far from optimal: due to fear and a misalignment of institutional and individual goals, they tend to disregard the technology suggested by schools, thereby missing out on opportunities to learn important information for supporting their children's education [102]. For many Latin\* parents, thus, the introduction of technologies as a mechanism for increasing parents' opportunities to access information has complicated even more their possibilities to overcome issues of information poverty in the domain of education.

## **2.2 Related Work: Immigrant Parents and Parent-Education Technologies**

In this section, I first situate this work in prior research on the role of technology in immigrants' information-access practices in general. Then, I describe how this dissertation specifically expands research in technology's support to immigrant parents' relationship to education. Finally, I explain how this research contributes to work on the design of parent-school communication for nondominant families.

### 2.2.1 ICT as Support for Immigrants' Information Practices

The continuous increase of immigration from lower-income to higher-income countries around the world has highlighted the relevance of understanding the role that ICTs can have in supporting immigrants' well-being as they adapt to their host country [34, 35, 36, 38, 39, 40, 41, 42, 103]. Work on this area has explored how immigrants from different backgrounds and nationalities use ICTs to integrate into their new environment [35, 36, 39], learning both about their context back home and their hosting one [34, 104], and end up constructing transnational identities [105, 106]. This research has demonstrated that immigrants often prefer to establish online connections with those they perceive more alike to them [38, 42]. Further, when navigating the early stages of their immigration experience, they are more prone to resorting to online media from their countries of origin [34, 107, 108, 109], preferring to access information and support directly from humans [36]. In general, their relationship with public social media like Facebook can be ambivalent [35].

While they are not generally concerned about the privacy issues these online platforms might pose, they still often struggle to participate in such media actively.

In terms of the design of technology-based initiatives, most efforts have focused on providing immigrants with assistance around information access, connecting with support forms [110], and acquiring new technology skills [111]. Shwarz et al. proposed Help Radar [110], for example, which provides ubiquitous assistance to immigrants in the U.S. in need to connect with volunteers. In a similar line, Gomez et al. designed Fearless Cards, a set of basic computer literacy instructions to help Spanish-speaking immigrant laborers overcome the emotional barriers of learning computer and internet use [111]. These designs could inform interventions for immigrant parents who are in need to connect to an information ecology for supporting their children's education. The applicability of these interventions, however, has yet to be understood in the context of parents' information practices, particularly, in alignment with the information practices and motivations of the other actors surrounding them.

### 2.2.2 ICT as Support for Immigrant Parents

Despite the efforts of fields like HCI and CSCW to understand how ICTs can support a wide variety of parenting tasks (e.g., building capital [112, 113], seeking social support [114, 115], accessing resources [116], and constructing parental identities [117, 118]), there is significantly less work exploring the situated information and technology practices of immigrant parents. Focusing largely on the context of Latin\* immigrant parents in the U.S., this growing body of work has mostly explored the parent-child dyad. Stemming from work in Digital Media and families at large, existing studies have investigated how these dyads deal with issues of digital inequities, often in relationship to information-seeking practices [25, 27, 43], and possibilities for mutual learning [43, 119, 120, 121, 122, 123, 124, 125, 126, 127]. This work has stressed that immigrant parents see in technology a critical medium for enriching their children's informal and formal learning experiences

[120, 127, 128] and seek to foster a family-focused and respectful use of technology at home [56]. However, they often struggle to find respectful and effective ways of enforcing healthy screen time with high-quality education media for themselves and their children [119, 129]. As such, they are more likely than native-born parents to seek advice from experts to face such imbalance [33].

This research has also suggested school staff, older children, and other parents as key actors for motivating parents' use of technology for learning [63, 130, 131] and has started to explore ways for supporting immigrant parents' particular relationship with these actors. As learning models like Connected Learning stress, children's success in connecting their interests and passions with learning goals depends on how the many different actors present in children's lives, including parents, can work together [132]. For low-income immigrant parents, who often belong to nondominant groups, attaining such connectivity entails overcoming fear towards learning to use new technologies that do not seem directly related to their everyday goals [35, 36]. Further, it involves overcoming distrust towards social interactions with those who they perceive as either too different from them (e.g., native-born parents) or with more authority than them (e.g., school actors) [13]. Existing parent-education technologies currently present at educational institutions, like electronic grade reports, digital newsletters, and websites or parent portals where teachers post information, do not regularly consider these parents' particular practices when trying to connect with learning-related resources and information [92, 93, 94, 95, 96, 97, 98, 133, 134, 135]. Instead, these ICTs follow a one-directional parent-school communication model that hinders parents' possibilities to express their concerns. Furthermore, by reinforcing the notion of institutionally-mandated interactions as "the norm," these ICTs disregard and devalue parents' engagement actions outside of what school mandates [22, 93, 94, 136].

### 2.2.3 The Design of Parent-Education Technologies and Nondominant Families

A handful of studies have investigated communication paradigms for reimagining the design of parent-education ICTs that can support parents from nondominant backgrounds [3, 24, 93, 134, 137], with only one initiative specifically targeting immigrant parents [3]. Leveraging educational perspectives that appreciate families' strengths, these studies have all sought to support parents' ability for building meaningful connections with schools and actors from educational institutions. [24] proposed that initiatives supporting parents' relationship with educational resources can leverage parents' desire to share personal experiences with their communities. In that line, [134] explored how to adapt a social networking site to parents' willingness to share more information about their families with teachers and other parents. In underserved contexts outside of the U.S., [4] investigated how a voice and SMS-based literacy intervention could scaffold support for parents in rural Ivory Coast to enhance their children's literacy learning. Regarding feasible support for immigrant parents, [3] proposed the Comadre SMS system, which successfully harnessed Latin\* mothers' social practices to distribute informal learning opportunities to other Latin\* parents. However, the relationship between parents and other supporting resources, including those coming from formal educational systems, lies largely untapped.

Research in education has stressed that initiatives supporting parents need to stem from an understanding of how they relate to their environment [13, 18]. This dissertation answers that call by offering an in-depth look outside of the parent-school-child interaction and into the environment in which immigrant parents act. In particular, this work contributes both systemic and participatory descriptions of the relational and dynamic practices parents use to share and make sense of information for supporting their children. As a result, it identifies essential opportunities for ICTs to leverage and augment parents' everyday practices and strengths to support their children's academic lives.

## CHAPTER 3

### THEORETICAL AND METHODOLOGICAL APPROACHES

In this chapter, I review existing theoretical approaches in the field of Education for studying parents' involvement in their children's academic experiences. Further, drawing from [13, 18] I describe the view of parental engagement that guides this dissertation's study, which represents engagement as a relational phenomenon taking place in an ecology or system of actors. Then, I examine the work on assets-based design done so far within HCI and beyond, identifying three aspects of this approach that require further attention. First, an a working definition of assets that enables the analysis of the design potential behind assets. Second, an approach to analyzing the relationship between individuals, their assets, and the assets present in individuals' wider environment. Third, methodological considerations for engaging in assets-based design from the bottom up, with communities and institutional actors. Finally, I provide an overview of the theoretical and methodological approaches that this dissertation proposes for addressing those pending aspects.

#### **3.1 Parental Engagement: An Ecological Perspective**

To gain a rich understanding of parents' participation in their children's education, this dissertation draws from the work of Carreon et al.'s in Education, who propose an ecological perspective of parents' engagement with schools and beyond [13]. Next, I review how literature in Education has explored parental roles and explain how the work of Carreon et al. guides this research and relate their work with ecological perspectives in HCI.

Educational research usually refers to parents' participation in their children's education as *parental involvement* [138, 139, 140]. Work in social science and education has long established that parental involvement as a key factor in children's development, academic achievement, and attainment of educational outcomes [136, 138, 139, 141, 142,

143]. When having to evaluate the parental involvement of marginalized populations, however, educational systems have historically focused on deficit-thinking models that have contributed to negative stereotypes of low-income ethnic minorities [13, 144, 145, 146, 147, 148]. Traditional assessments have over-stresses involvement as a static list of activities society and institutions value, thereby disregarding the wide variety of social and cultural practices that different parents put in place to help their children succeed [138, 139, 149, 150]. In the case of Latin\* immigrant parents, this has resulted on the generalized perception that these parents do not value education and that, given their lack of cultural, social and human capital, they are unable to be the role models their children need [10, 58, 81, 83, 86, 151, 152]. However, in the past ten years there has been a shift in the vision of parental involvement that calls for a focus on assets rather than deficits when studying and devising educational initiatives for nondominant groups [10, 13, 14, 18, 47, 138, 145].

As a result, scholars and practitioners have proposed the term engagement, rather than involvement, as a way to highlight that understanding parents' participation is not only about identifying what parents should do [136, 145, 153, 154]. It is also about how the educational system interacts and collaborates with parents to share the responsibility for children's learning [23, 154]. While some definitions of parental engagement stress only the relevance of fostering parent-teacher and parent-school collaborations, the majority make a call to go beyond schools [136, 145]. Epstein, a long-term proponent of parental involvement [149, 155], changed his views and proposed to replace involvement with 'school, family, and community partnership', which emphasized how even community members need to share responsibility with parents and schools. The work of [13] and [145] go beyond the need for shared responsibility and call for analyzing parental engagement as a messy web of interactions taking place across a system of actors, each impacting a particular aspect of a continuum between parental involvement with schools and parental engagement with children's learning experience. Seeing parental engagement as a web of interactions returns value to every activity that parents do to support their children. Further, it provides

that value in parents' terms rather than in schools' or teachers'.

Amongst these views of parental engagement as a complex web, Carreon et al.'s emerges as one of the few that exemplifies how to analyze parents' activities as part of that web [13]. Working with immigrant parents in U.S. American schools, they conceptualize parental engagement as parents' dynamic, distributed, and interactive social practices that parents use to navigate barriers between home and school. Further, they argue that, to create changes in the educational system, it is key to study the visible and invisible efforts that parents engage in this social practice, across an *ecology of parental engagement*; a network of individuals, resources, and spaces that parents navigate and leverage to support their parenting goals and the aspirations they hold for their children [13, 18]

With regards to technology use and design, such an ecological approach can also illuminate a rich understanding and future-envisioning of technology roles in the lives of parents. As HCI scholars Nardi and O'Day explain, seeing systems through the metaphor of an ecology allows to expand the view of technology as a tool that the user can control [156]. In an ecology, individuals have agency over how they relate to each other and to technology, finding ways to co-evolve together. An ecological view also contributes to a feasible analysis of complex systems. Systemic analysis of technological introductions tend to be excessively pessimistic. By stressing the complex arrangement of social and technical forces, systemic analysis end up disregarding individuals' acts of resistance against systemic power. In contrast, seeing a system as an ecology brings the complexity down to a human-manageable scale, enabling the exploration "of realistic points of leverage, ways into the system, and avenues of intervention." [156]. Further, the ecology metaphor recognizes the presence of "*keystone species*," or individuals whose capacities make them necessary for supporting an effective introduction of technology, thereby, becoming crucial to the survival of the ecology itself.

The view of parental engagement as taking place in an ecology has potential to illuminate information flows and channels that would remain otherwise invisible. Across the

five studies of this dissertation (S1 - S5, described in Chapter 4 and 5 ), I draw on this perspective to highlight the complexity behind parents' actions to access and make sense of information within and beyond schools.

## **3.2 Assets-Based Design**

A key contribution that this dissertation makes to the field of HCI is a demonstration an assets-based design process that addresses a large-scale system. In this section, I offer an overview of how assets-based design emerged and has evolved in the field of HCI. From there, I identify a working definition of assets and a process for designing with assets, as two pending challenges for the field. Finally, I offer an overview of the different theoretical and methodological approaches that this dissertation leverages for addressing those pending issues.

### 3.2.1 Origins and Existing Efforts

Recognizing ICTs' growing potential to support social change, the HCI and related communities have increasingly explored design processes and methodologies for ensuring ICTs that sustainably support historically underserved groups [17, 71, 157, 158, 159, 160, 161]. Informed by the long-established Human-Centered Design (HCD) approach, these efforts have produced various novel methodological strategies [71, 160, 162, 163], analytical lenses [61, 164, 165], and participatory perspectives [166, 167, 168]. However, the field continues to fall short in producing socio-technical approaches that ensure lasting impact in contexts affected by intersecting challenges of scarcity [6, 17, 76, 166, 169, 170].

Building from educational perspectives [19, 48] and methodologies like Assets-Based Community Development (ABCD) [49, 171], a growing body of HCI scholars argues that one underlying reason for falling short of securing a lasting impact is a prevalent needs-finding and needs-solving view of design [3, 6, 17, 70, 172]. Prioritizing user needs, these scholars argue, promotes dependency and robs agency from change-makers, thereby hin-



dering sustained change. Instead, they emphasize an *assets-based approach* to research and design that focuses on identifying the *assets* that users already have (e.g., existing knowledge, strengths, and capacities) rather than working from what they lack, and thus, need.

Typically using ethnographic methods, and sometimes exploring participatory ones, assets-based work in HCI-related spaces has explored the presence and potential of various forms of strengths, from institutional resources within large-scale systems [173], to intangibles such as funds of knowledge [174, 175], care [16], solidarity [72], cultural values [176], social networks [3], and local expertise [17, 52, 172]. The problem areas for leveraging assets have also been highly diverse, including the support to immigrant parents across contexts [3, 175, 176], assisting refugee resettlement [15, 17], and exploring reintegration paths for sex-trafficking survivors [70].

While designing from users' "haves" can promote agency, autonomy, and, from there, work towards sustained impact, incorporating assets in the design of technology-enhanced interventions is not simple [6, 50, 52]. Core to leveraging assets in design is attaining a rich understanding of the relationship between individuals, their assets, and their wider environment, all of which demand a shift in value and praxis [52, 53, 70]. Working from assets requires researchers and designers to reflect on *what are assets, from whose perspectives, and how to determine assets' design potential*. In addition, working assets-based design from a participatory perspective can raise *methodological challenges*, such as how to facilitate participants' critical understanding of their assets in relationship with their broader context, and reflections on whose assets to prioritize in design and the realistic potential for assets to support change.

### 3.2.2 Assets: Exploring Definitions and Implications

HCI scholars' proposal of an assets-based design is rooted in diverse ways of looking at strengths across fields, from education [19, 48, 77] to participatory approaches for re-

search and community development [49, 74, 171, 177, 178, 179, 180]. However, what are strengths and from whose perspective to understand them, still requires a concrete, working definition. Next, I review different perspectives on resources, assets, and strengths across fields, analyzing their potential to address the complex ways individuals and communities overcome disadvantages. I conclude by explaining the working definition of assets that this dissertation uses and describing how its five studies (S1 - S5, described in Chapter 4 and 5) address aspects of this definition.

The term *assets* comes directly from the literature on Assets-Based Community Development (ABCD), which proposes assets as local resources that hold the potential for supporting communities' economic development [49, 178]. Although the term is relatively new to the field of HCI, the intention behind it is not. Other action-based, participatory approaches to community transformation, like Participatory Action Research and Participatory Design, which increasingly inform HCI research and practice, also champion the idea of uplifting local knowledge and skills to change a situation that is oppressing and detrimental for a community's well-being [167, 177, 179, 180].

All these different views of assets converge in the idea of positive, static traits that individuals and communities hold and that have the potential to be productive for supporting a particular type of transformation (e.g., economic, social, educational, etc.). From this perspective, supporting community development entails working with the community in identifying their assets, which are what the community already has and does well, and leveraging those assets in initiatives that can make communities more autonomous [3, 17, 78, 181]. Various HCI and non-HCI scholars, however, have called for complicating that view of assets-based development. In seeing assets as positive traits that individuals need to thrive only, there is the risk of dismissing strengths that are not apparent, and that individuals do not necessarily associate with productive or positive experiences [6, 16]. Further, as Amartya Sen explains, identifying resources is not enough for working towards communities' well-being [182]. Having a resource does not mean one can attain a particular goal

with it. From Sen's perspective, it is essential to understand individuals' and communities' *opportunities to act*, transforming existing assets into the ways of doing and being that *they value* and have *reason to value*, which he calls capabilities. To be able to use assets mindfully and effectively, thus, various scholars argue for a richer understanding on how assets operate as individuals interact with their wider environment [50, 51, 183]. That is, to see assets in action, unpacking what assets are important for who and in what circumstances, and from there, derive new uses for existing assets.

A pending question is how to define assets so that we can better see them in action, including the goals that individuals pursue in choosing to use one asset over another, and the opportunities to use assets for other goals. Anne Swidler's view of cultural capacities could help explore answers to that question [55]. Swidler suggests culture as a *toolkit* of resources like symbols, stories, and rituals that individuals gather in their interaction with their environment at large. As people have the opportunity to use these resources, they cultivate skills, habits, and styles, adding them to their toolkit (*e.g.*, knowing how to read people and being able to carry on casual conversation). Over time, they learn how to use the resources, skills, habits, and styles of their toolkit to assemble persistent *strategies of action* for routinely pursuing problem-solving goals. Individuals' cultural toolkit and their strategies of action constitute their cultural capacities to solve problems (see Figure 3.1). Defining assets as cultural capacities sheds light on important considerations for seeing assets in action. First, capacities are historically-accumulated, thus, it is important to understand why they exist and how they came to be. Second, people often use capacities in assemblages, thus, a capacity seen in action can be further broken down into more capacities. Third, capacities demonstrate people's creative problem-solving skills but that does not mean they are always effective; they are often shaped by structural barriers and conflicts with other strategies.

The work anthropologist Arjun Appadurai offers a possibility to further expand the view and goal of understanding capacities as assets for development in the context of poverty.

He poses that, in such contexts, it becomes critical to understand and foster two specific cultural capacities: the capacity to aspire and the capacity to contest and debate existing societal norms [54]. Poverty, he explains, pushes individuals and communities to develop an ambivalent relationship with dominant societal norms, which obscures how they develop and pursue their aspirations. On the one hand, to maintain dignity, the poor tend to show cynicism and rejection towards societal norms, which often prevents them from pursuing traditional aspirations. On the other, they also develop deep moral attachments with many norms that directly support their own degradation. This, in turn, can push them to admire those who have attained traditional aspirations and prevent them from appreciating other possible ways in which they can pursue transformational pathways. From this view, the capacity to aspire is the capacity to break away from this ambivalence, and to craft, hold, and pursue aspirations that are transformational not only of their reality but of dominant cultural norms. As such, this capacity depends on individuals' and communities' capacity to critique and contest the systems that surround and limit them.

Drawing from Swidler's and Appadurai's work, this dissertation defines assets as cultural capacities and assets-based design as the process of understanding how to use individuals' cultural capacities for goals related to strengthening people's capacities to aspire and contest. Phase 1 (S1 - S3, described in Chapter 4 ) unpacks how and when the multiple actors in the context of the educational system mobilize their capacities to support parents' access to learning resources. Phase 2 (in Chapter 5) demonstrates how PD with parents can help them identify how and when they use their capacities and envision feasible uses for those capacities for aspiring novel parent-education ICTs. This phase also demonstrates how to transfer parents' insights on their capacities to institutional actors, working with them in envisioning pathways for supporting parents' capacities to aspire new parent-education ICTs and contest the educational system in the process.

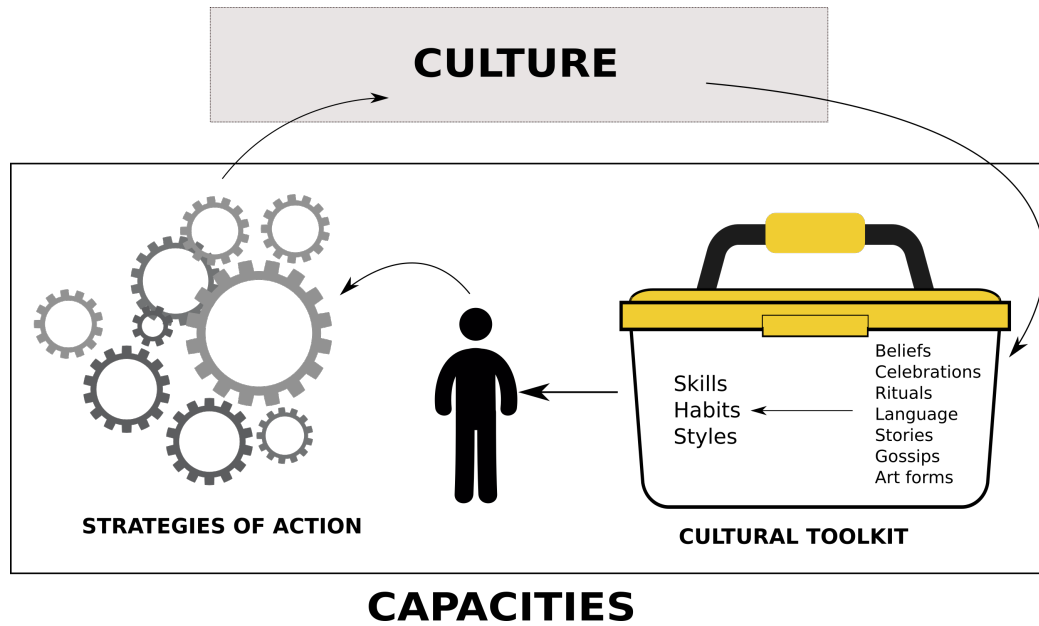


Figure 3.1: Visual sketch of the theory of culture-in-action

### 3.2.3 How to Design with Assets

As an approach inspired by other disciplines but relatively new for HCI, assets-based design is still in the process of defining methodological pathways and commitments for identifying assets and using them in the design of technologies. Seeing assets as static, positive traits that communities can seemingly identify, participatory approaches for design and development, propose methods like appreciative inquiry [184], assets mapping [171], and critical recovery [180]. These methods can pose issues when trying to engage with the complexity of assets as dynamic and emergent based on individuals' interactions with their wider environment. Further, their emphasis on the locality of communities only might not be as suitable when seeking to also generate lessons at a systemic level [51, 185]. That is, it might disregard the assets of institutional actors acting outside the community boundaries, trying to support the community in different ways. As a result, existing approaches and methods might struggle to generate lessons that can move from the bottom up, pushing for changes in larger-scale systems that can support community-based transformations.

The development and demonstration of methods for identifying and designing with the

assets that operate dynamically in a large-scale system, where different actors hold different assets and privileges to mobilize them, is still a pending challenge for the field of HCI. In this section, I review how assets-based design efforts in the field have grappled with this challenge to-date. First, I describe emerging efforts in HCI for informing the analysis of the design potential of assets in large-scale systems. Second, I explain the methodological considerations that participatory approaches to design, research, and community development have offered for an assets-based design. In both cases, I describe how this dissertation illuminates analytical and methodological decisions for understanding assets and designing with them.

### *Analyzing The Design Potential Of Assets*

Designing for large contexts with multiple stakeholders is a fundamental challenge for HCI [60, 186]. Recognizing the power of ethnography to provide holistic views and amplify multiple voices across contexts [187], most work in HCI has focused on exploring analytical lenses for unpacking the complexity of assets from ethnographic data [6, 16, 72]. There is less research exploring the use of assets in the design of interventions [3, 188].

In the study of assets and their potential for design from ethnographic data, the focus has been on unpacking possibilities in large-scale systems such as education and health [6, 16, 72]. Studying possible roles for technology in diverse low-resource learning environments across India, Wong-Villacres et al.'s used intersectionality as an analytical lens for exploring how interacting “processes of differentiation and systems of domination” continuously shape individuals’ and communities’ abilities to mobilize their assets [6]. They concluded that the privileges—or assets—and penalties that individuals experience are not static but dynamic traits that can shift depending on who they interact with and where.

To further explore assets’ complexity in large systems, Ismail et al. drew from feminist solidarity—which stresses that marginalized groups can gain much by learning from their shared struggles—to identify the assets of frontline health workers operating in India’s

health system [72]. The use of solidarity as a lens highlighted how this actor navigates multiple stakeholders' demands to pursue data-collection to advocate for underserved groups. Expanding the scope of analysis from one to multiple actors, Karusala et al. used the ethics of care to explore caring behaviors in an underserved learning environment as assets enabling the environments' operation. From there, they concluded pathways for technological interventions that could better align these behaviors and the motivations behind them [16].

While some existing research has addressed large systems, there is a dearth of approaches for connecting the understanding the design potential of assets at a large-scale level with community-situated understanding of their assets in action. Such a generalizable-to-particular understanding can be critical for supporting community-situated work in moving bottom-up, impacting actors at meso- and macro-institutional levels. This dissertation addresses this challenge by demonstrating a generalizable-to-particular, multi-perspective approach to analyzing the assets in action in the educational system (described in Chapter 4) and then contrasting them against assets-based insights from PD with parents (Study 4). This analysis approach foregrounds how STS lenses such as Actor-Network Theory [189, 190] and the language of seams [191], can illuminate the assets that emerge in human-human and human-nonhuman interactions in a large socio-technical system. It also shows how how a view of assets as cultural capacities [55] can enable a rich analysis of situated assets—where they come from, why, and how and when they are used—and tether potential uses for design.

#### *Facilitating Bottom-Up Assets-Based PD*

As mentioned before, in principle, many participatory approaches to design and research with communities hold an assets-based intentionality [74, 168, 177, 180]. Their goal is to ensure that communities can leverage their existing strengths, resources, knowledge, and skills to build empowering capacities. PD, for example, was born precisely as an approach to facilitate workers in industries in discovering the tacit knowledge they have developed

when working with technologies, critically reflect on it, and then use it to negotiate work practices and policies with institutional actors (e.g., employers, management experts) [73, 192, 193]. The recent work on PD with communities has pushed for a return to those values, stressing PD as as the ongoing *infrastructuring* of the commitments needed for communities to leverage their knowledge and skills and work towards addressing them together [167, 194].

However, the methodological particularities of how approaches such as PD and PAR enact their commitment towards identifying, exploring, leveraging, and amplifying assets with community actors and beyond, could be further analyzed and discussed. Given the long-term nature of many PAR and PD projects, these are often discussed in high-level narratives [163, 167, 195, 196]. In HCI, only a handful of HCI projects have described in detail how to conduct design assets-based initiatives with communities [3, 17] and fewer have championed a participatory approach to assets-based design [70, 188, 197]. Further, along with recent calls for PD to strengthen its ability to work with institutions in supporting community-led changes—also known as institutioning [198], there is also a need to engage in deeper reflections on how knowledge about assets can move from the ground up. More specifically, it is critical to explore how PD can support communities and institutions in becoming publics, considering their power differences [185].

In adding the assets-based qualifier to PD as an approach for working technologically-supported transformations with communities, this dissertation highlights how a commitment to assets can impact designers' methodological decisions when interacting with communities and institutional actors. In this section, I review how an assets-based process might specify the way PAR and PD promote reflection towards emancipatory actions. From there, I conclude describing the pending methodological aspects that this dissertation explores for guiding an asset-based participatory design endeavor.



**Assets-Based PD as a Process of Critical Consciousness** A critical task for participatory approaches of research and design is to work with communities in analyzing the different processes of oppression and systems of domination curtailing their possibilities to thrive [177, 179, 180]. A perspective for working towards that level of analysis that all participatory approaches share is that of Paulo Freire’s concept of critical consciousness or conscientization [199]. For Freire, the historically oppressed are often entrapped in the “here and now,” which prevents them from seeing the larger systems that keep them trapped. To break away from oppression, they need to engage in conscientization, recognizing and analyzing themselves as decision-makers in relation to the social and political situations that influence and limit their life chances. Such a process, Freire posited, entails constant dialogue, reflection, and action around everyday problems. For PAR, this process is essential for communities to reflect on their reality and “see through” the ways in which the establishment exploits local production and knowledge for its own benefit [180]. PD’s original proponents also drew inspiration from Freire’s view, but current practitioners argue that, as a discipline, PD could do more to foster communities’ engagement with Freire’s commitments towards social and political reflection [161].

As mentioned before, this dissertation proposes and pursues a view of assets-based design as the use of existing cultural capacities for designing technology-enhanced interventions that can strengthen communities’ capacities to aspire and contest (See 3.2.2). This view’s emphasis on contestation aligns with Freire’s notion of conscientization [199]. Fostering conscientization can help communities in challenging their aspirations, supporting them in reflecting on why they hold them, what limits them, and how to reconfigure them in ways that contest those limitations. However, working from an idea of assets as culturally and historically accumulated capacities suggests a rather particular take when working towards critical consciousness. Rather than focusing on unveiling systems only, critical consciousness needs to also foster a rich analysis of capacities in relationship to their environment, including technology. That is, it needs to allow designers and participants to 1)

unveil how their capacities operate with regards to larger systems and processes (e.g., how capacities came to be, why they are used, when, and how, when they are successful, when they are not); and 2) learn how to use these capacities to challenge their realities, redefine their aspirations, and work towards them.

**With Vulnerable Groups** Working with vulnerable groups in an assets-based PD as the conscientization of capacities in relation to their larger environment suggests critical methodological implications. Designers need to provide participants with the emotional support needed for feeling comfortable about expressing and analyzing their capacities. It also becomes important to facilitating participants' criticality of their assets, the system, themselves, and the introduction of new technologies in their lives. Finally, it implies finding ways for participants to avoid falling in a deficit-based perspective of their realities and instead, notice, appreciate and work towards building their assets.

In the second phase of this dissertation (described in Chapter 5), S4 describes methodological decisions during an assets-based PD engagement as a process of conscientization with Latin\* parents, a historically marginalized group in the U.S. educational system. Chapter 6 reflects on the challenges and methodological implications of such a process.

**With Institutional Actors** Another pending aspect to understand for facilitating assets-based PD as conscientization is how to engage with it when moving from working with communities to working with institutional actors. Outside institutional actors such as government agencies, nonprofit organizations, researchers, and university staff, can act as the support structures that the philosopher of democracy John Dewey, saw as essential for allowing individuals to grow and develop as they participate within community life [185]. These actors can provide resources that are hard for the community to secure, like training, spaces for action, cultural brokering, and funding. More importantly, as Dewey explains, it is through the exchanges and mutual learning between communities and institutions that democratic governments can reinvent their institutions and respond to social demands.

PD experiences taking community initiatives for technology-based changes to the institutional domain illuminate that, in fostering a connection between communities and institutions, designers often have to manage large-scale limitations [195]. Further, they have to often act as intermediaries, expanding their PD repertoire to embrace new skills such as diplomacy, communication, advocacy, and frame-shifting [196]. When conducting assets-based PD as conscientization with institutions, it remains critical for designers to also reflect on the methodological choices and ethical considerations needed for transferring the knowledge of community's capacities to actors working outside of the community scope. Specifically, how can designers work with different institutional actors within a large-scale system in exploring how their assets and the assets of vulnerable groups can work together, while still prioritizing the assets of those most vulnerable?

The fifth study (S5) of this dissertation grapples with this question. It describes methodological decisions during an assets-based PD engagement as a process of conscientization with meso-level institutional actors in the educational system. Specifically, it demonstrates an initial attempt to communicate communities' insights to institutional actors and to engage these actors in imagining feasible paths for the system to embrace and support communities' views. This process focused on translating the knowledge of Latin\* parents to these actors and explore a) how they could support parents' assets-based visions of the future and b) how they would like the system to change for supporting Latin\* parents. Chapter 6 includes a reflection on the methodological implications of weaving the assets of a vulnerable group from the group up.

**CHAPTER 4**  
**PHASE 1: UNDERSTANDING ASSETS IN THE ECOLOGY OF PARENTAL**  
**ENGAGEMENT**

As described in Chapter 1, to illuminate assets-based pathways for parent-educational technologies, this dissertation undertook two research phases. First, an ecological phase, leveraging ethnographic fieldwork to identify assets—and their interactions, alignments, and misalignments—at a systemic level. Second, a participatory phase, that worked with Latin\* parents and with other actors in the system to elicit their reflection on assets and support their envisioning of assets-based parent-educational technologies. In this chapter, I describe the three studies (S1-S3) of the first ecological phase. Study 1 and Study 2 provided a view of assets operating across the educational system, describing how these assets impact the possibilities of two different groups of parents—first U.S. American parents from low- and high- income backgrounds (S1) and then Latin\* immigrant parents from a low-income background (S2)—for accessing and using resources that support their children. Study 3 (S3) expanded the understanding of the ecology by exploring the information and technology practices of those actors in the ecology acting as assets-aligners to craft and maintain information channels for Latin\* families. Besides providing a thorough understanding of the ecology of engagement for Latin\* parents, this phase offers a theoretical contribution, demonstrating how STS theories such as ANT and the analytical language of seams, can illuminate a an understanding of assets across a large-scale system.

## **4.1 [Study 1] Parent-Education Information Channels in the U.S.: An Analysis of Their Support to Parents' Assets**

### 4.1.1 Introduction

The mass adoption of ICTs in schools across the U.S. has given technologies a critical role in enabling communication channels to support parents' engagement in their children's education [200]. There is, however, little empirical work on how these ICTs interact with the system, its actors, and these actors' assets to shape parental engagement practices. Such understanding becomes a critical baseline before exploring the reality of particular groups across the system. Drawing on Carreon et. al's view of parental engagement as happening in an ecology of actors and dynamic interaction spaces [13] and using a definition of assets as cultural capacities (both described in Chapter 3), in Study 1 addressed that pending need [53]. It explores how online and offline communication spaces allow low-, middle-, and high-income parents across the U.S.—and other ecology actors—to mobilize their capacities for ensuring meaningful information exchanges. Specifically, this study explored the following research questions:

- *RQ 1:* What are the different online and offline spaces that parents in the U.S. use as information channels to support their children's education?
- *RQ 2:* How are technology-mediated communication spaces enabling parents and school actors to mobilize their different assets for accessing information that supports children's education?
- *RQ 3:* What are the opportunities and challenges for parent-education ICTs to support spaces where parents and others actors can mobilize their assets to facilitate access to information for supporting children's education?

In answering these questions, this study contributes design guidelines for parent-education technologies to foster meaningful information exchanges across educational systems in the

U.S.

#### 4.1.2 Concepts

##### *Spaces*

To better understand the assets—or cultural capacities (see Chapter 3)—that support information exchanges amongst members of parents' ecology of engagement, I use the concept of *space* described by Barton et al. [18]. They define a *space* as a setting in which members of the ecology come together to engage in meaningful exchanges for establishing their presence in their children's education and influence it in traditional and nontraditional ways. Looking at the online and offline spaces in the ecology illuminates the capacities that different actors leverage to create, maintain, and participate in these spaces.

##### *Meaningful Interactions*

Interactions amongst parents and schools is an issue of concern for educational researchers. Parent-school interactions entail mostly the delivery of school-directed information (e.g., parent-teacher conferences where teachers inform parents about their child's progress and activities, an email with a newsletter, etc.) [136]. However, these restricted types of exchanges tend to hinder parental agency to impact the school environment [137, 200, 201]. Teachers tend to interact with parents as if they are visitors [202]. Feeling unwelcomed, parents tend to perceive that their interests and ideas for improvement are not considered valuable.

For these reasons, many researchers have argued that supports for parent-school interactions need to go beyond the exchange of depersonalized information, and instead, focus on supporting actors in the parenting ecology to mobilize their capacities—or assets—for making these interactions meaningful for all parties [93, 133, 137, 200]. *Meaningful interactions* enable all parties to represent their capacities (e.g., home practices, school practices, teacher's and parents' practices) and interests to impact the schooling environment.

Moreover, meaningful interactions allow participants to interpret others' shared information in terms of their own particular purposes and agendas. To better understand technologies' possibilities for supporting ecology actors' use of their capacities, in this study I analyze parent-school offline and online interactions through the lens of meaningful interactions.

#### 4.1.3 Methods

This study was conducted with the support of a research team. To understand the relationship of existing parent-school technologies with capacities—or assets—in the parental ecology, we analyzed interviews with parents about the technology they use to communicate with schools and to stay informed on their child's progress. We also observed parents using existing parent-school related technologies.

##### *Parent Interviews*

We analyzed 63 semi-structured interviews conducted with parents in the U.S. to understand the types of parent-school interactions that communication technologies currently support. These interviews were part of a larger study about parents' strategies for finding learning opportunities for their children [203].

Interviews included questions on the relationship between parents and teachers and the technologies they use to communicate. Participants were from three different audiences: 28 parents were from a low socioeconomic status (SES) from a southern U.S. urban area, 15 parents were from a high-SES in small towns and rural areas in the Midwest of the U.S., and 20 parents were from a high SES in suburban and urban areas across the U.S., mainly concentrated in the southeast. The age of participants' children varied from one to eighteen years old.

### *Technology Observations*

In addition to the 63 interviews, we reached out to 9 parents and 2 teachers from various backgrounds to understand technology's role in supporting parents' creation of online communication spaces. We asked these informants to direct us to the current technologies parents and schools use to interact with each other (e.g., Class Dojo, email, Facebook pages/groups, etc.). We observed one informant using technologies that require private access such as school email, Class Dojo, and closed groups of parents on Facebook. We also interacted with publicly available technologies (school Facebook pages, schools' websites, and teachers' blogs). We took detailed notes of the content managed in these tools, as well as on the existing online interactions taking place.

### *Data Analysis*

Interviews were transcribed, and participants' names were anonymized and replaced with pseudonyms. Using the transcripts and the notes taken during our observations of the technologies, we conducted an inductive approach to data analysis, grounded in coding techniques. We generated a set of codes that described patterns related to technology support—or lack thereof—for individuals' use of their capacities to engage in meaningful information-sharing. Then, an iterative analytic process allowed us to generate themes that were reduced over time and that led to the findings I present in this paper.

#### 4.1.4 Findings

I organize this study's findings based on the concept of *spaces* within the ecology of parental engagement. This focus on spaces allowed me to identify parents' capacities to engage in meaningful information-sharing and participate in their children's education. In this section, I *first* describe the types of spaces identified. *Then*, I offer an list existing parent-school technologies, classifying them in terms of the types of support they offer towards parents and other actors using their capacities to engage in meaningful information-



sharing. *Last*, I describe the barriers these technologies pose to ecology actors' use of their capacities for accessing and making sense of resources that can benefit their children.

### *Interaction Spaces*

Based on this study's findings, I identify two types of parent-education communication spaces: *formal* and *informal*. *Formal spaces* are owned by institutions or organizations like schools and the Parent Teacher Association (PTA). *Informal spaces* are owned by parents, teachers, or other actors, but operating outside of formal boundaries (e.g., parents informal meetings with teachers when they are picking up their children from school, and parents' groups on Facebook).

This study's findings also show that spaces can be characterized by interactions both in the physical and digital world. Sometimes digital interactions help maintain spaces in the physical-world. For example, the exchange of text messages and emails between parents and teachers informs parent-teacher informal conversations during pick-up time. Other times, spaces are created and maintained by almost only digital interactions. This is the case of school's Facebook pages and websites.

#### **Formal Spaces**

This study's data showed that most interactions in formal spaces (e.g., the classroom, science nights, and school's Facebook page) involve the exchange of institution-directed information only. These findings are in line with previous work, which found that institutions like schools often define the terms of the parent-education relationship [93, 137].

While formal spaces tend to be one-directional mostly (from institutions to parents), the data revealed that these spaces can support meaningful information exchanges by when they allow institutional actors' capacity to access, curate, and share community-based educational resources (e.g., information about Summer camps and after-school programs). Section 4.1.4 describes in more detail how and when technology-mediate formal spaces afford the use of the aforementioned capacities.

## **Informal Spaces**

Informal spaces are spaces created by parents—and sometimes by other actors of the ecology—for sharing information outside the school boundaries (e.g., WhatsApp and Facebook groups as well as conversations with teachers during pick up time). The fact that these spaces are non-institutional can afford parents more freedom than formal spaces to mobilize various capacities, including that one of sharing concerns and resources of various kinds with peers. Participants in these spaces tend to show less fear about possible judgment from education authorities. As such, these spaces tend to allow parents to mobilize their capacity to access information via close, one-on-one negotiations with others. Section 4.1.4 expands on this capacity and how parents mobilize in technology-mediated informal spaces.

However, freedom to mobilize capacities is not necessarily guaranteed. The level of freedom these spaces offer highly depends on factors like the cultural homogeneity of members in the space, and how visible the space can make all members' cultural and social capital. Section 4.1.4 expands on the nature and impact of these factors in parents' ability to access information for supporting their children.

### *Technologies and Interaction Spaces*

In this section, I describe the current parent-school communication technologies, classifying them in terms of the type of services they offer. For each group, I analyze how these technologies enable formal or informal spaces, and how they support parents and other actors in using their various capacities for engaging in meaningful information-sharing.

**Technologies for Classroom Management** Classroom management technologies allow schools to create digital *formal spaces*. Schools use these technologies to inform parents on their child's academic progress or behavior. For example, Class Dojo is a cross-platform application for community-building where teachers post photos or videos of moments in the classroom to help parents stay informed on what their child did in class.

Parents can also instant message teachers, but not other parents. Other technologies for classroom management include customized versions of “parent portals” offered by various school districts and schools. These are web-based applications where teachers can post students’ grades for parents to see and send messages to parents.

These technologies often allow for parents to communicate with teachers on a one-on-one fashion. However, the experience of Carlos exemplifies how these spaces often limit parents’ use of their capacities, often driving them to create their own informal spaces outside of these classroom management platforms. He describes how he reacted after learning about her daughter’s grades on the school’s parent portal:

*“Even though she, on certain tasks, she was not getting good grades, I never saw the test. And so I couldn’t try to figure out where she is having issues. I just took the opportunity whenever we could talk face to face [...] so on one of the parent nights that I went, I wanted to talk with him [the teacher]. ”*

[Carlos, father of a high-schooler]

Carlos’ experience suggests that formal spaces like classroom management platforms might struggle to make parents comfortable enough to raise questions on issues that matter to them. One-on-one spaces for close interactions and information-negotiations, outside of school formality, might be more conducive to parents’ information-exchange capacities.

### **Technologies for Community-Building**

From the data for this study emerged a strong tendency for institutions like schools and after-school programs to use community-building platforms—like their Facebook pages—as formal spaces for broadcasting institutionally-mandated information (e.g., events or general weather advice to parents). Sometimes, institutions also use public platforms like Twitter to communicate with parents on more urgent matters, like a late bus arrival. In addition, institutions like schools ask their teachers to post all classroom related information on school-hosted blogs, where parents can also add comments. To reinforce institutional

control over these platform's content, many of these sites do not allow parents to post information directly in their sites. The owning institution has to first approve any potential new post. As such, the possibilities of actually building communities in these online spaces is highly constrained.

Parents and other actors also use community-building technologies to self-organize into *informal* communities with other parents and, sometimes, also with teachers. Miranda, for example, shared how useful a "Mom's Google group" was to her.

*"A lot of the moms in the class, we are on a Google Group, so we'll all email each other when there's different events coming up, or when there's an educational thing that we want to bring to the school."* [Miranda, mother of a pre-schooler]

Other times, parents use one-on-one communication platforms like SMS, email, and phone calls for accessing resources from their offline communities. Although community-building technologies supporting informal spaces can afford members a greater flexibility for using their capacities, parents' experiences suggest there are critical aspects to consider for ensuring such flexibility. Parents' behavior on their online, community-building informal spaces suggests visibility of friends' cultural and social capital as a critical factor to consider. For example, Renata's confidence towards her Facebook contacts' knowledge about educational resources motivated her to temporarily make her Facebook wall into an informal space for meaningful information-sharing:

*" I would go on Facebook and post something and see what my friends who have kids the same age might recommend. Yeah. If there's something ...say, 'Hey. My kid needs extra help in history. What do you know that's out there' then I might type something and then with how Facebook works in 30 minutes you've got 10 different ideas coming in at you."* [Renata, mother of a middle-schooler]

While critical, visibility of cultural and social capital, might not be enough for supporting parents' use of their capacities. Carolina's account highlights cultural homogeneity as another critical factor for motivating parents to use their capacity of accessing information via close negotiations. She describes how her phone-supported informal space with close friends at church made her feel free to ask questions to her friends about key resources for her child:

*"Then when she [Carolina's daughter] adds the AP classes into it, it will be interesting to see how that all kind of plays out. A lot of my friends at church have kids that have already gone through high school, or not gone all the way through but have kids higher than what Mia is. I call them up and say, 'OK. Now what do I do?' Or even just asking about teachers. I mean your child is going to have that teacher but sometimes it's nice to know: Is it a hard teacher? What are the quirks of this teacher? So that you can kind of prepare her to kind of work around."* [Carolina, mother of a high-schooler]

Although cultural homogeneity might be key for motivating meaningful interactions in informal and formal spaces, it is not really feasible in formal spaces. An important question, thus, is how to design spaces where parents with diverse cultural backgrounds and capital can feel free enough to act, enriching the spaces where they interact.

### **Technologies for Personal Communication**

As a whole, the study's data highlighted that parents and institutions use technologies such as emails, text messages, and phone calls to foster different types of spaces. Institutions like schools use such technologies to build *formal spaces* that can operate outside of institutional boundaries. These technologies also support parents' efforts to create *informal spaces* within the schooling environment.

The data collected showed that institutional actors like schools and teachers use personal technologies for strengthening the presence of existing offline textitformal spaces. For example, teachers use email to inform parents about their child's in-class activities

and progress. Schools often use text messages, phone calls, and emails to send messages to all parents en masse. However, often times these institutional actors often use mechanisms to hinder parents' ability to engage in two-way communications via these platforms. For example, most SMS messages do not allow replies, thereby hindering opportunities for parents to develop the close relationships they see to activate their information-sharing capacities.

These formal spaces supported by personal communication technologies, thus, struggle to provide opportunities for meaningful information-exchanges. However, the collected data showed that exceptions do arise when educational institutions are able to create formal spaces where they can leverage their capacity to act as a critical community-building actor. The data suggested that community actors like local business, nonprofit organizations, and religious institutions see educational institutions like schools as an important path to accessing community members en masse. Thus, some of these institutions were able to receive, curate, and share diverse information with families. As Victoria shared, parents particularly appreciate when schools, for example, send them messages, even paper-based ones, with this information. This type of use of formal spaces gives parents a starting point to find more resources that directly align with their children's learning needs and parents' financial possibilities (e.g., direct suggestions about finally-convenient extra curricular activities).

*“They [the school] usually send material home with the student [about educational programs]. And there’ll be information that is provided that way, and they’ll usually have a link back where you can find out more information on webpage or something about it, if you need additional information.”* [Victoria, mother of two high-schoolers]

In an effort to ensure they have the freedom to leverage their capacity to access information via one-on-one, close negotiations, some parents also use personal communication technologies either to create their own informal spaces. Outside of the scope of education,

parents often use this capacity to make sure they access information that resonates with their context and needs. When needing to access information from institutional actors like teachers, this goal becomes more complex: parents use this strategy on a regular basis to also ensure they build a close, personal relationship with these figures of authority. In doing so, most parents testimonies suggest they are not only working to have more agency on how and what they discuss with authorities. They are trying to make these figures of authority accountable for supporting their children's academic success. Parents' use of this capacity often entails continuously resorting to face-to-face interactions (e.g. stopping by the school, visiting the class, showing up to conferences, and even volunteering to help in class). Close, technology-mediated information channels like SMS and email, and cell-phone calls with teachers and institutional staff are also critical in helping parents pave the way for creating and maintaining those informal spaces. Tamara, explains how she depends on these technologies to develop a sense of closeness with her daughters' teachers.

*“All of her teachers, I develop close relationships with them. I even have their cell phone numbers. I email sometimes. I might just stop up to the school to visit the class or check in on her. But a lot of times if I can't get them at the school I always try email first. But I ask them if they don't mind me having their cell phone number, and most of them never mind. So, yeah. I have a lot of access to her teachers.”* [Tamara, mother of a middle-schooler]

In addition, parents, such as Pablo and his wife, use these technologies to activate informal spaces of interaction with other parents.

*“What will happen generally is that I don't email her friends' parents a lot, but let's say I hear something from our daughter about a camp that one of her friends went through, I may either wait until I see that parent and talk to them about it or I send them an email. So technology does facilitate that and like I said, I bet my wife emails and stuff more than I know, because she won't copy*

*me on things like that, but she uses word of mouth but she also uses texting and emailing to ask.” [Pablo, father of a middle-schooler]*

### *Parent-Education Technologies: Barriers for Meaningful Interactions*

The analysis of existing technologies that the research team and I conducted revealed four critical barriers that the design of current digital tools often create, preventing members of the ecology to mobilize their capacities: (1) inflexibility in the boundaries of digital spaces, (2) issues of inequality, (3) fragmentation and inconsistency of information, and (4) lack of relevant non-academic information. In this section, I discuss these issues in detail.

#### **Inflexible Boundaries**

Parent interviews reconfirmed the ecological nature of effective parental engagement. Within this ecology, parents interact with different teachers, parents, friends, and relatives. As a result, the existing formal and informal spaces in the physical world often have either boundaries that are either too easy to transgress or too ill-defined. For example, a formal space addressing the whole school (e.g., school newsletters via email), school staff can share the availability of offline formal spaces for classroom-based interactions (e.g., parent-teacher conferences). Also, parents often create informal spaces to interact with parents and teachers from different grades and schools, breaking away from the school grades’ paradigm of grouping and accessing parents. Esther explains how the possibility to interact with parents from different schools and grades has helped her.

*“I wasn’t that thrilled with the [child’s school] experience. So, I was kind of looking for stuff on my own, trying to be an advocate for my daughter and just finding what I could find online. Then when this came up again, my friend who is an attorney said, ‘Oh, you forgot about the IB Program’, because we were looking at alternatives. I said, ‘You know what? I had that in the back of my mind, but I kind of forgot it was there.’” [Esther, mother of 2 middle-schoolers]*

Flexibility in terms of space boundaries, thus, gives parents freedom to use their ca-



capacity for accessing information via close negotiations. However, this data shows how the design of existing technologies does not fully account for such flexible boundaries; most existing technologies set either either too spread out or too restrictive boundaries. Class Dojo, for example, restricts interactions by only allowing parents to interact with parents of the same classroom. And even then, it constraints possible ways to interact by only allowing parents to communicate with others through comments they can post on school's and teachers' posts. This lack of opportunities for parents to connect with others hinders possibilities for parents to expand their presence within the parenting ecology. Something similar happens with technologies that support informal spaces between parents and teachers, such as email and SMS. These technologies are good at reinforcing a notion of connectedness, closeness, and thus, information-sharing via one-on-one negotiations. However, they do not support parents ability to engage in meaningful interactions with more members of the parenting ecology.

In contrast, the collected data showed how technologies such as Facebook allow too many individuals of the parenting ecology to come together. This also impacts negatively opportunities for meaningful interactions. For example, a parent-led Facebook group can have up to 200 to 300 members. This suggests that these digital environments can become overwhelming for many parents, especially considering the relevance of cultural homogeneity in making parents comfortable for negotiating information about their children.

### **Issues of Inequality**

The observation of existing technology conducted for this study demonstrates that these tools do not adequately support all members of the ecology to equitably leverage their capacities. This, unfortunately, prevents parents from establishing their presence in the schooling social system.

Technologies specifically designed for supporting formal spaces assume schools should be in charge of initiating communication with parents. For instance, in Class Dojo, teachers have to first post content before parents can respond. Likewise, in parent portals, teachers

generally have to update the site with assignments and grades so that parents can react accordingly. These systems assume parents' role should be rather reactionary, affording parents very little agency to leverage their capacities for shaping their children's education.

Technologies like Facebook, that have not been explicitly designed for schooling endeavors, also tend to reinforce inequities, both in formal and informal spaces. For example, Facebook requirement to declare a page ownership (e.g., whoever creates the page owns it) tends to shape participation in digital formal spaces. In these spaces, posts by parents on a school Facebook page can be dismissed or even deleted by school administrators. Although it could be argued that Facebook and schools do give parents opportunities to post, parents' voices are vulnerable to strict moderation and censorship by a higher, more powerful authority. This, in turn, can make parents feel like the school restricts their capacities and does not value their opinions. Facebook-supported informal spaces also have problems of unequal participation. These groups have the potential of broadening parents' access to members of the school ecosystem. However, the interactions I observed in Facebook pages stress that parents need to be cautious of what they post in these groups. Certain topics, such as complaining about a teacher, could get parents in trouble with teachers or school administrators.

In addition, both formal and informal spaces on Facebook lack mechanisms to foster equitable integration of potentially marginalized parents. I observed that in these online communities a select group of members with privileged voice establishes the etiquette and social norms of the space. Parents who do not share similar cultural backgrounds, or have the same social capital, are not aware of these norms could, therefore, feel hesitant to participate because of their lack of knowledge of the type of questions or responses that are appropriate. For example, an immigrant parent may not understand what a potluck means and may feel it is inappropriate to ask teachers to further explain the concept. Tacit knowledge is best learned through peer-to-peer communication. As peer-to-peer communication is either restricted or hard to achieve in these spaces, parents are not given the opportunity

to teach or learn some of this knowledge.

### **Fragmentation and Inconsistency**

Both observations of technology and the conducted interviews revealed that current technology fragments parent-school interactions by distributing information via too many channels of communication. Schools frequently use SMS, Twitter, Facebook, emails, and paper notifications to send information to parents. This issue of fragmentation is worsened by the fact that none of the existing channels can satisfy all the needs of the ecology. For example, Class Dojo allows parents to see what is going on in the classroom, but does not show grades. Parent portals allow parents to see grades, but not what is happening in the classroom. Such high fragmentation can hamper meaningful interactions by overwhelming and preventing parents from making sense of the received information. Parents, such as Monica and Karl, told us how this fragmentation affected their ability to understand the context of the information.

*“I know my child’s school has been good. They have already invited us to join the Facebook page. If you do Twitter, join this. I got a 16 page newsletter from the PTA in May. I’m like, ‘How long is this thing?’ But it was great. It gave me so much information. But then because I’ve never done this before I’m like, ‘Is that who I am going to get my information from, the PTA? Or is it going to be from the Facebook page?’ How does that work? I don’t know.”* [Monica, mother of 2 middle-schoolers].

*“I talk [with teachers] pretty much regularly. For the most part...If I don’t get a phone call at least once a week...giving me an update...I get emails. These are the assignments that are due next week, so I hear from them pretty regularly...and it kinda gets a little cumbersome because with one in high school and one in middle school...there are about 8 different teachers that will contact me \*snaps fingers\* back-to-back, and it seems like they always come at*

*the same time for information. ” [Karl, father of two middle and one high-schooler]*

Inconsistency in the way information is managed in some digital formal spaces is also an issue. Parents, such as Marina, told us how this affected their engagement.

Marina (M): “ *Because communication is an issue, so I do rely on other parents in the similar grade and I get information about what they are doing in their classrooms and stuff like that, I get information. But some teachers are very good in posting things online so I can go and visit their website and get information and some are not.*”

Interviewer (I): “ *So do you wish there was more interaction with his teachers?*”

M: “ *I don’t ... I don’t really wish for that. It’s not going to change our life in any way but I do feel that if they had a website set up and there is information updated on a regular basis, it does help the child and the parents to kind of stay ahead and be prepared for it.*” [Marina, mother of a middle-schooler]

This inconsistency forces parents to seek other mechanisms that do afford the one-on-one, close negotiation that parents need to access relevant information about their children. Anahi shared how she relies more on her child’s memory than on the information delivered by digital formal spaces.

*“The teachers, most of them have websites that let you know when things are coming up. Not all of them do or they are just not able to keep it up or whatever. I understand that too. So just kinda a variety of ways between websites and him telling me and most of the time remembering to study. I just keep asking him, ‘Do you have anything coming up this week?’ He’s usually pretty good about remembering. That’s probably the most reliable, is him.” [Anahi, the mother of a middle-schooler]*

The information inconsistency of formal spaces negatively affects engagement. It can discourage parental intentions to construct a close relationship with the teacher. This might not be a problem for parents who have already strong connections with other members of the ecology. However, for parents who depend on their relationship with the school and the teacher, inconsistency can impact the entire parent-school relationship.

### **Lack of Relevant Non-Academic Information**

Current technology supports sharing academic information well. Applications like a school district's parent portal, Class Dojo, and even email can easily, and sometimes immediately, update parents on their children's academic progress. Parent interviews, however, confirm that most parents also strive to access nonacademic information directly or indirectly related to their child's academic life. Engaged parents, like Jaime, are not hesitant to move beyond the information teacher provides to find out how to provide extra-curricular learning opportunities to their children. He describes how he leverages his information-management capacity to select and garner ideas for learning experiences:

*“Usually every summer I have something that I try to plug them into. A lot of times it's art stuff, because that's hard to fit in and I do consider that academic, because involves a lot of the problem-solving. I sort of watch the kids who are moving and shaking in the school. I'm usually friends with the parents. So word-of-mouth as to 'what is your kid doing this summer?' and then you start finding out about opportunities that may be really good. I find good stuff, I bookmark it or stick it in a folder, and I write it down. Is she going to apply this summer for this program, and when does she need to apply next summer for another program? You kind of put them in the back of your mind so that you might know what some of the criteria might be so that your kids can be ready to be a competitive applicant for some of the programs.” [Jaime, father of 2 high-schoolers]*

On the other hand, parents who have limited opportunities to engage with more mem-

bers of the parenting ecology, struggle to find opportunities to better assist their children. Their access usually depends on how well they know how to search online information or how good their relationship with teachers is. As a result, many of these parents are either not aware of existing opportunities or cannot find opportunities that suites their constraints. For example, Leonor, a working mother of a middle-schooler, shared that her daughter had no regular exposure to non-academic educational support (e.g., out-of-school programs, museum visits, educational books). Her answers suggest this lack of exposure is a result of a lack of interaction with other members of the ecology.

Interviewer: *“What about educational books?”*

Leonor: *“I bought some for her for Christmas.”*

I: *“What books did you buy?”*

L: *“I bought like a math book and some writing books. Those are the ones she needs help with the most, her writing skills and math.”*

I: *“Okay. How did you find those books?”*

L: *“I just looked.”*

Gabriela and Rosa told us how hard it has been for them to look for opportunities online alone.

*“So, she’s interested in everything STEM, you know. I’m challenged with the cost of after-school programs, summer programs. I was online today googling around for affordable programs. There are camps at [local college], they mostly have programs for high school kids. Then I did find something on the Boys and Girls site. Try to get the ball rolling.”* [Gabriela - mother of a middle-schooler]

*“He’s brought home some things from school, even on the engineering route, just some of them are really expensive. So it’s hard to...you know kind of figure that out. Some of the programs, like at colleges, like [name of a local*

*college] or whatever, some of the programs are, you know, pretty expensive. You know like \$3,000 to do something like that. So it's kind of hard to.” [Rosa - mother of a 16 year-old]*

Despite technology facilitating some teacher to parent communication, this study’s interviews indicated that this was not enough for parents to be effectively engaged with their children’s education. As this study’s data shows, existing technologies in formal spaces, very rarely work to send parents non-academic information that matters to parents. Moreover, parents who struggle the most with leveraging their capacities in the ecology end up disconnected from possibilities to create or participate in informal spaces that could allow them to leverage those capacities.

#### 4.1.5 Design Guidelines for Parent-Education ICTs

The findings indicate that current technologies struggle to support meaningful interactions that lead to strong communities amongst all members of the parental ecology. Four issues were identified: inflexibility in the boundaries of spaces, fragmentation and inconsistency of information, issues of inequity, and lack of relevant non-academic information. To address these issues, I suggest a set of design guidelines for digital interaction spaces. These guidelines aim at giving parents and school actors (teachers, staff, etc.) more leeway for leveraging their capacities when interacting in ways that are meaningful to them, coming together as an equitable community. (Figure 4.1). In the following sections, I describe the proposed design guidelines and suggest possible technological approaches that could be used to realize them.

##### *Allow Members to Define Community’s Boundaries*

Parents do not always connect with parents or teachers from their children’s school. This study’s findings highlighted that parents that are able to mobilize their capacities to support their children, transcend the boundaries of the school. In fact, parents can connect and

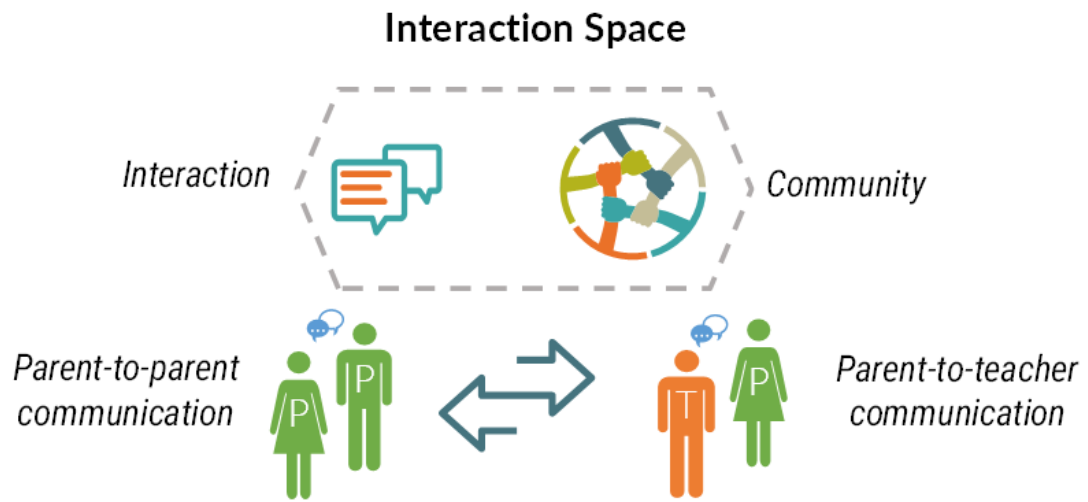


Figure 4.1: Interaction Space Overview

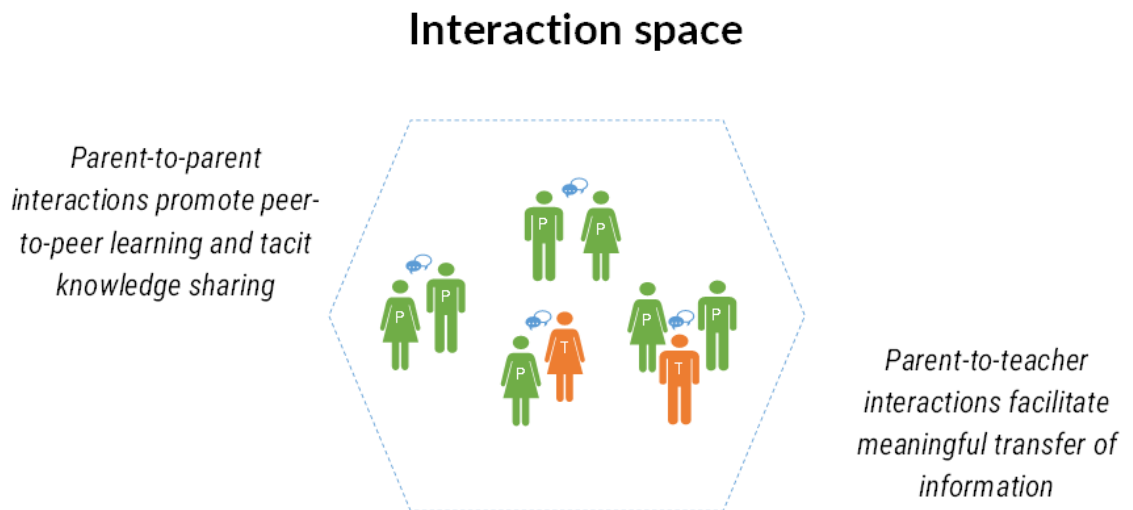


Figure 4.2: Single Interaction Space



align with each other along a variety of identities, such as ethnicities and special needs. In addition, as I learned during technology observations, extremely large formal and informal spaces tend to hinder meaningful interactions. An interaction space should allow members to define the boundaries that best suit their social and communication needs so as to enable all users to exercise their voices.

### *Augment Opportunities for Equitable Participation*

This study's findings showed that *informal spaces* are key for parental engagement. These spaces offer important opportunities for parents to leverage their capacities for engaging in information-sharing via closeness. However, issues like cultural heterogeneity and number of participants in the space can hinder parents' opportunity to participate.

To enable equitable opportunities for all members of the space to issue their voice, engaging in one-on-one negotiations when needed, an interaction space needs to allow parents and other actors to create as many interconnected interaction spaces as needed. Instead of just a single interaction space, where one big community comes together (Figure 4.2), there can be multiple interaction spaces, each with their own configuration and properties (Figure 4.3). Multiple, perhaps even transient interaction spaces can offer the freedom needed for parents to engage in different forms of information-sharing.

A huge challenge for multiple spaces is the ability to effectively leverage the tacit knowledge of the whole community. This could be addressed by introducing machine intelligence to the system. Approaches such as a generative profile building can allow members across spaces to communicate. For example, a teacher from the third grade, can reach out to a teacher from sixth grade to ask a specific question, or a parent (from space A) with some specialized knowledge can help his/her peer (from space B) with a special question.

A critical aspect to consider in an environment that enables these multiple connectivity is to safeguard privacy and security—a balance that is hard to achieve. Different types of

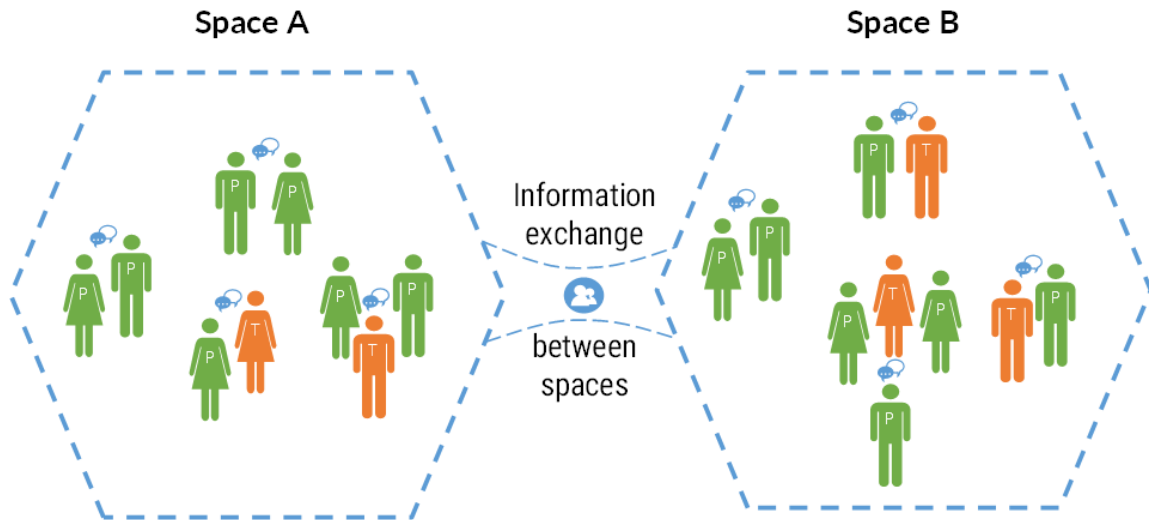


Figure 4.3: Connected Interaction Spaces

conversations require different levels of privacy. For example, in a conversation around teacher performance, there may be a chilling effect if a parent knows a teacher can view the conversation. Utilizing privacy-by-design principles, parents can have conversations with other parents or form groups that allow proper privacy controls.

*Provide a Unified and Organized Source of Information*

An interaction space that enables meaningful interactions amongst members should also address issues of fragmentation of information. This study’s findings showed that numerous channels of communication often bombarded parents with information, which hindered their capacities to make sense of information. An interaction space should offer a unified channel of communication that gathers and integrates information from other channels. Members should be able to define the type and frequency of information they receive. In addition, information in this space should be organized and streamlined in a way that is meaningful for parents. Automation mechanisms informed by user preferences could be used to achieve this goal; for instance, the space can leverage options such as crowd-sourced tagging (e.g., similar to online Stackoverflow forums) or automatic-topic tagging

(e.g., similar to the question-answering platform Quora) or a combination of these. An interaction space should avoid becoming yet another tool that parents have to learn to use to keep up-to-date with school. To address this issue, I suggest leveraging parents' existing knowledge of current technologies (e.g., parent portals, Facebook, text messages, and emails). Features of the interaction space should be inspired from familiar platforms to reduce the learning curve to increase adoption.

### *Enable Access to Relevant Information*

As this study's findings revealed, formal spaces that provide access to relevant academic and nonacademic, are critical for giving parents the freedom needed to deploy their information-sharing practices. I found that successfully engaged parents often resort to a group of teachers and peers as their go-to people for accessing key information. For many other parents, however, effective go-to people are harder to identify. This is especially true for parents who are new to the community and/or lack social capital. Interaction spaces should allow for information to be decentralized and delivered to members of the community in a way that is meaningful to them.

A potential approach for satisfying this guideline is to leverage machine intelligence. The intelligence can match opportunities, parents, events, etc. by indexing the relevant information. Topic modeling techniques can distillate key points in people's interactions. Using the topics most discussed by a user, a profile about that user can be built over time in a generative manner. For example, if the parent of a child engages in a lot of discussions around college opportunities, the system can use natural language understanding and topic modeling techniques to add tags to the said parents profile dimensions. When a new member asks for recommendations on funding opportunities to attend college (a previously indexed topic), the space should have intelligence in the back-end that curates and channels questions to the appropriate parties.

## 4.2 [Study 2] The Ecology of Latin\* Immigrant Parents: Identifying How Assets Interact to Support Information Channels

### 4.2.1 Introduction

As described in the previous section, the first study (S1) offered an overview of parent-education technologies' current status across different U.S. educational systems. Specifically, it shed light on how these technologies' interplay with other system actors facilitate or hinder parents' use of their capacities—or assets—to engage in children's education. The second study (S2) aimed at mapping out the interplay between actors' capacities and existing online and offline information channels in Latin\* parents' specific ecology of engagement [204]. For that purpose, I explored the following questions:

- *RQ1* What are the human and non-human actors mobilizing their assets to shape information channels for low-income, Spanish-speaking Latin\* immigrant parents in the U.S.?
- *RQ2* How do actors in the context of low-income, Spanish-speaking Latin\* immigrant parents in the U.S. align their assets to enable information channels that benefit parents?
- *RQ3* What are the challenges and opportunities for parent-education ICTs to align with and amplify actors' assets as they support information channels for low-income, Spanish-speaking Latin\* immigrant parents in the U.S.?

To answer these questions, this study relied on a 1.5-year ethnographic study of Latin\* parents' ecology of engagement, mapping out the ecology, its actors, and interacting capacities through the lens of ANT. ANT's focus on how human and non-human actors negotiate their interests to form stable alliances [205, 206] has the potential to illuminate how various capacities in the ecology interact for supporting or hindering information channels. As a result, this study makes two contributions to the design of parent-education technologies.

*First*, it offers a rich description of how diverse capacities in the ecology of Latin\* parents' engagement interact to support or hinder online and offline information channels. *Second*, it illuminates opportunities and challenges for technology to support information channels that harness and augments parents' capacities. This study also contributes to HCI's understanding of assets-based design by demonstrating how an STS theoretical perspective can support a capacity-focused analysis of a large-scale system.

#### 4.2.2 Actor-Network Theory: A Lens for Understanding Assets in a System

To analyze how the capacities of the many actors in Latin\* parents ecology of engagement interact, dynamically to support or hinder information channels, I drew inspiration from Actor-Network Theory theoretical approach. ANT fundamentally rejects dwelling on systemic analysis that divide the social from the technical [207, 208]. Instead, it attempts a deep understanding of how *human* and *nonhuman* actors align their *interests* to form and maintain networks of *alliances* or *associations* [190, 205, 209]. From an ANT perspective, thus, both human and nonhuman actors have the agency to establish and affect alliances; they all have interests and motivations. Non-human actors such as mobile apps, for example, might lack intentionality but embed *attributes* conveying a particular discourse which can shape other actors' interpretations, thereby helping to maintain or break up associations [206, 210].

In HCI, the ANT framework has proven to be productive for understanding the creation and maintenance of various, different sociotechnical systems (e.g., cyberstructures [211], the mobile media consumption culture in India [212], and others [213, 214]). In this study, I use ANT as a lens analyzing assets in the shape of capacities interacting across a large-scale system. ANT's focus on network formation allows a view of the ecology of parental engagement as a sociotechnical system with different actors, mobilizing their interests to convince others in coming together to each attain their goals. The particular emphasis on interests' alignment is promising for an analysis of capacities: interests stress strategies of

action to attain goals, which in turn can highlight the complex reasons that drive different actors to align these strategies for creating stable information channels in the ecology, or fail to do so, leading to unstable or inexistent channels. Attending to [] critiques of this ANT, however, in this study I make particular emphasis on analyzing network associations from a view of actors' histories, trajectories, and decision-making power.

Such a capacity-focus analysis of what capacities work together—or not—in a large-scale system sheds light on different opportunities for technologies to augment capacity-alignments towards the benefit of parents' information needs.

#### 4.2.3 Methods

To gain a holistic understanding of the information ecology or network of Latin\* immigrants, I conducted a multi-sited ethnography across 12 locations in urban Atlanta, U.S. from 01/17 to 05/18. This study's field locations included five schools and the ESOL—English as a Second Language—department of a school district I will call Lakeside, one NGO (non-governmental organization) I will call Solidaridad, one religious organization I will call Alianza Religiosa, and four after-school centers. Participants included 30 parents and 25 staff members at the different locations I studied (6 school liaisons, 2 members of a school district's staff, 8 school teachers, and 9 members of supporting organizations). Recruited parents belonged to low-income groups <sup>1</sup>, half of them held 1-2 jobs, and all had lived in the U.S. for 6 months to 17 years. These parents' educational attainment was generally low, with only 5 reporting to have finished high-school. A summary of this study's parent participants' demographics can be found in Table 4.3. With regards to the organization staff members I studied, all had a bachelor degree, and the majority were female (22 of 25) of Latino background (14 of 25).

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<sup>1</sup>Family income is less than twice the federal poverty threshold [215].

Table 4.1: Summary of parent participant’s gender, age range, their children’s age range, and their country of origin

#Parents	Gender	Age Group	Children’s Age Group	Country of Origin
30	Female (28) Male (2) <sup>2</sup>	22-45	4-17	Mexico (27) El Salvador (1) Honduras (1) Ecuador (1)

The research team and I collected data across three distinct periods of time through semi-structured interviews and (participant/non-participant) observations. First, I studied an elementary school in Lakeside district. (1/17-5/17). Finding that most Latin\* parents did not attend school functions frequently, I visited Solidaridad y Alianza Religiosa, two supporting organizations targeting Latin\* families (8/17-12/17). The data I collected there revealed the key role of school liaisons and after-school programs in influencing parents’ access to information. To access these stakeholders, I visited the ESOL department of the Lakeside school district (which manages the liaison staff), four schools the department staff recommended for learning about school liaisons’ relationship with parents, and four after-school centers targeting Latino children. The Lakeside school district and the schools I studied were likely confident they were investing wisely in supporting Spanish-speaking families. Thus, I recognize the collected data might highlight practices that are not prevalent in less invested schools. Details of the study’s field locations, including type of location, methods, types and number of participants, and hours invested are found in Table 4.4.

Throughout this fieldwork, I also attended events held by different schools/organizations: two college fairs targeting Latin\* families, one parenting workshop for low-income Latino parents, a school district’s liaisons’ meeting, and the International School Night at an el-

<sup>2</sup>The low participation of fathers in this study is representative of gender roles in most Latin\* households, where women are primary caretakers of children [216].

elementary school I studied. I also participated for 20 hours as volunteers at a computer literacy training program that one of the institutions I visited offered to Spanish-speaking Latin\* immigrants.

All interviews and conversations lasted 45-90 minutes and took place in participants' language of preference (Spanish or English). The data I collected was in the form of field notes and audio recordings, which I transcribed, translated, and analyzed through an inductive, interpretive process [217]. I coded the data thematically to identify emerging patterns relevant to information management practices related to supporting children's education. The identified patterns (*e.g.*, "class-based issues in the Latino community", "teachers' detachment from parents' realities", "children mediating their own education") highlighted the need for a framework to describe the many entities present in participants' surroundings, and the complexity of these entities' information exchanges. This led us to choose ANT as a framework for further guiding the analysis. With ANT in mind, I conducted another iteration of coding, focusing on identifying the human and non-human entities in the network, their interests and motivations for forming associations, and the stability—or lack thereof—of such associations.



Table 4.2: Details of data collection periods, including types of locations studied, methods, type and number of participants, and hours invested per research period

<b>Time</b>	<b>Location</b>	<b>Methods</b>	<b>Participants</b>	<b>Hrs</b>
1/17 - 5/17	<i>Lakeside school</i> <i>district:</i> - 1 elementary school	Interviews / Conversations Observations	- 8 teachers - 1 liaison - 9 parents 50 parents	50
8/17 - 12/17	<i>Across Atlanta:</i> - Solidaridad (NGO) - Alianza Religiosa (religious org.)	Interviews / Conversations Observations	- 21 parents - 4 NGO staff 120 parents	120
1/18 - 5/18	<i>Lakeside school</i> <i>district:</i> - ESOL deparment - 2 elementary schools - 1 middle school <i>Across Atlanta:</i> - 4 after-school centers	Interviews Observations	- 2 ESOL staff - 5 liaisons - 4 centers' staff 120 parents	20

#### 4.2.4 Findings

Four main categories of actors emerged to define the network that parents navigate for managing the informational resources they need to support their children's education. These included the familial unit, the schooling environment, the community at-large, and the technology. Based on my analysis of ethnographic fieldwork, I articulate the different interests and capacities I see them holding—many of these shaped by culture, language, and class—and how these interests' and capacities' alignment or misalignment determine the

quality of the information channels that these actors establish with each other.

### *The Familial Unit*

There are three members of the familial unit who are central actors in parents' information network—mothers, fathers, and children. Different circumstances determine how mothers behave in the network, and how children—and sometimes fathers—mobilize their capacities to become key information carriers between mothers and schools.

#### **Mothers**

As described in other studies, I found mothers more frequently managing information related to children's education [216]. I saw a pattern in their capacity use that suggested they perform at least three roles in the network. These roles are by no means permanent for they may evolve and overlap as the network does. The first was that of the *resourceful mother*, who engages with a wide variety of actors within and outside the school to build strong information channels that allow her to gather resources for helping her children. The second was the *trusting mother*, who tends to trust the school system as well as the capacity of her children to be independent learners, and thus, prefers to allow her children to mediate her relationship with the school. Parents enacting this role, however, build information channels with close networks outside school to secure additional support for their children. The third role was that of the *insecure mother*, new to some aspect of the educational system and thus eager to access new information channels with different actors around her, but also highly susceptible to mistrusting these actors and the information they provide.

Rita is 37 years-old with three school-going children and often mobilizes her capacities to enact the role of a *resourceful mother*. She emigrated from Mexico 15 years ago with no knowledge of English and a few years of school education. Over time, however, her life experiences taught her that the only effective way to help her children was by engaging in improving her own education. She explained, "I learned English on the go, because I

realized that if I cannot communicate with others, I cannot understand what my children need from me.” From Rita’s perspective, learning opportunities are always available; accessing them is more a matter of monitoring and creating the right information channels. Her experience with learning English illuminates her approach:

*Initially my kids’ homework where ‘en chino’<sup>3</sup> [in a completely foreign language (e.g., in Greek)] to me, but using translators and dictionaries, I started using homework as a way to learn new words. I also realized that watching TV and YouTube videos with my children helped me learn new expressions. Then I took classes that the school advertised and even learned more about computing. Another thing that helped me was losing the fear to talk to Americans, because when you talk to them they usually do not make fun of you but correct you and teach you new things.*

Other parents’ realities, however, force them to develop and mobilize different capacities, which sometimes prevent them from opening and managing as many information channels as Rita does. Elena, a 35 year-old mother of four children (ages 4 to 16), is more at ease being a *trusting mother*. Like Rita, Elena arrived to the US from Mexico more than 15 years ago, and with a limited schooling background. For her, mobilizing the resources for being at school as frequently as Rita is not possible. For starters, transportation is a hurdle; she does not own a car nor knows how to drive. It is also hard for her to find someone to babysit her children when she leaves the house, and she finds it problematic—and expensive—to take the bus or cabs with her children. Besides, she does not speak English and does not feel comfortable trying to speak to teachers. Given her current inability to be at school and develop a closer relationship with teachers, she chooses to mobilize her capacity to trust them as figures of authority, trying to align her ability for information sense-making with teachers’ capacity of pushing information to parents. As Elena said:

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<sup>3</sup>To recognize the decisions about cultural meanings that the translation process entails [218], I have kept certain terms—loaded with participants’ assumptions, feelings, and values—in their original language.

“Teachers are always keeping me updated about what happens with the two little ones [ages 4 and 9], they keep sending me messages with information about what the kids have to do, about projects they need to work on, and even photos of what they are doing in the classroom.”

Acknowledging her limitations with English, and education in general, Elena also chooses to align with her children’s capacities by trusting they can engage with and navigate their education on their own as much as possible. She is particularly proud of her children becoming independent learners: “They pretty much do their homework on their own, and have done so ever since they started to go to school. I keep telling them that it is their responsibility to understand what *la maestra* [the teacher] says, and ask questions to her when they need to”. For Elena, a parent’s capacity to engage entails supporting this independence as much as possible by harnessing information channels with school and outside-school actors. Through teachers’ remote messages, Elena monitors the status of her kids’ to-dos, and is informed about possible modes of action when children need support (*e.g.*, buying a computer to support homework). Further, when her children need support, she mobilizes her capacity to gather information from close interactions with peers, resorting directly to her close network (*e.g.*, her group of *vecinas* [female neighbors]) and relying on them for organizing meetings where they can help each other’s children with projects and homework.

When mothers encounter a new situation they do not know how to handle, I found many become extremely *insecure* about how to make sense of the information surrounding them. That was the case of 28 year-old Monica, for example. She recently immigrated to the United States from Mexico with her two boys (six and eleven years-old) and husband. Although she holds a higher level of formal education than Rita and Elena, the emotional and cultural burden of trying to help her children during these times of transition causes her to struggle with deciding what information channels to access and which to trust. Knowing that she needs information, she leverages her capacity for exploring every possible informa-

tion channel she can (e.g., teachers, school apps, school emails, other parents, neighbors). At the same time, cultural and linguistic clashes produces a misalignment between her information-seeking and current trusting capacities and school information; thus, she ends up distrusting much of the information she access. This excerpt from a conversation between her and other parents reveals her insecurities in trying to decide how to act based on the information she has received:

*My 6 year-old is struggling with everything here. It has reached the point where he just does not want to come to the school anymore. Teachers say that he was very behind with school when he came in. I feel they are just being unfair to him because they keep saying he arrived knowing nothing, as if he had not attended school before, but that is not true. He went to school in Mexico for two years before we came. I have talked to everybody here, including Paula [the bilingual school liaison], to see how they can help me yet nothing changes. I think they do not care about helping Antonio [her son]. Did you all go through a similar experience?*

Katz and Gonzalez found that immigrant parents' decision to adopt technologies are highly dependent on "localized structural and cultural forces" [102]. The cases of Rita, Elena, and Monica suggest that the motivation to choose certain information-seeking capacities might be also dependent on their ever-changing immigrant circumstances (e.g., a trustful mother could become insecure when facing a new problem). Technology design, thus, might cater to these ever-changing situations. For example, technology could provide mothers like Elena with information channels that she currently cannot access (e.g., conversations with U.S. Americans). Further, parent-school technologies could minimize overloading mothers like Monica with information that could make her distrustful.

### **Fathers and Children**

This study's findings show that the collective media engagement that low-income immigrant families tend to practice [56, 126], often makes fathers and children responsible for

mediating the relationship with schools. This mediation, however, can entail a misalignment of motivations, and from there, of capacities, that negatively impacts mothers' access to information. For example, Raul (30 years-old and a father of 3) is the only member of his household with an email account, which he set up to look for jobs. He is therefore in charge of letting his wife Gabriela know about any emails sent by the school. Since he is the only one with some knowledge of English between the two, he is also the one translating conversations between Gabriela and their children's teachers. Gabriela, however, often misses out on important information because Raul does not check his email often enough, or sometimes forgets to tell Gabriela about school news.

Given children's mastery of the English language and of technology, it is them, however, who are more often made responsible for mediating tasks [219]. As [43, 121] have shown, when helping their parents with everyday online tasks, children usually mobilize their cultural capacities to add value to the information they transfer. For example, 13 year-old Daniela taught Barbara, her mom, how to call her using WhatsApp so that they could talk without consuming voice plan's minutes; and 10 year-old Jose, explains to his mom the nuances of new words and expressions when she is helping with his homework. However, this study's findings show that, when having to translate school information to parents—such as grades and requirements to install new school apps—children tend to not align their capacities in the same way. Oftentimes they are imprecise in explaining the meaning of information to their parents. In Daniela's case, for example, when Barbara asked her about an app teachers were asking Barbara to install, she vaguely replied "I think it has something to do with grades." Other times, children become entirely accountable for controlling school information without teaching their parents how to manage information on their own. By her mom's request, Angela, a 16 year-old girl, is in charge of the app for checking her younger sibling's grades. Angela's mom still does not know exactly what the app is for or how it works. Children's role as brokers entails many opportunities that might be harnessed for more effective information transfer [121]. At the same time, I found that,

where the end goal is to broker parent-school information/technologies, a misalignment of interests can make children leverage their capacities in ways that can make them unreliable brokers

### *The Schooling Environment*

Key actors in the schooling environment who strongly impact parental engagement include teachers, bilingual school liaisons, and other parents. Next, I describe them and their capacities and actions in the ecology.

#### **Teachers**

Teachers' connection to children, parents, and the educational world places them in a privileged position for accessing and conveying information that might support children at school and beyond. I saw two distinct roles that teachers enacted when leveraging their capacities to share information for children's well-being: the *information-publisher*, who uses their technology-management capacity to provide parents with information that is not particularly relevant to children's familial context, and the *negotiator*, who leverages their cultural and language familiarity to provide parents with information tailored to their constraints and capacities for supporting their children.

Dianne, a 27 year-old African-American fourth grade teacher in a school where 60% of students are Spanish-speaking, consistently harnesses her experiences with minoritized students to align with Latin\* children academic and emotional circumstances and provide them with the support they need for rejecting deficit-based views of their capacities. For example, when Pablo, 10 years old, struggled with math problems, Dianne advised:

*I know you feel frustrated with Math sometimes, but that is because you have to struggle with two languages in your head, and that actually makes you smarter than many other kids in the classroom who cannot speak two languages and are still unable to solve the math problems you are able to solve.*

Dianne, however, is not quite sure how to engage with Latin\* children's lives beyond

school. Attempting to bridge cultural and linguistic gaps further seems too daunting. Further, Latin\* parents are not as physically present at school as other parents, and thus, for Dianne, learning about their capacities and experiences is not as feasible. Her motivation to help leads her, thus, to support these parents by constantly *publishing information* for them through parent-school apps such as ClassDojo and parent portals. With the help of an interpreter, Dianne also lets these parents know details about their children's performance during parent-teacher conferences. Although her approach works for resourceful mothers like Rita—who are unafraid to voice their concerns—it can pose an obstacle for trusting and insecure parents who are looking for information that fits their particular situation. Dianne, for example, was completely unaware that, after receiving the last report card, Pablo's mom had decided to quit her job and was now struggling to monitor Pablo's learning at home. When meeting with Pablo's mom, Dianne chooses to report on Pablo's academic situation and avoids asking Aura questions about her everyday life and Pablo's context at home. Finally, she *pushes information* to Aura about what Aura needs to do at home to ensure Pablo recognizes his potential to achieve academic goals, without exploring how Aura makes sense of her advice or how feasible it is for Aura to follow it.

Similar to Dianne, Yaritza—a 31 year-old Latina fourth grade teacher at a school with 80% Latino students—deeply cares about at-risk Latin\* children. However, unlike Dianne, Yaritza is able to mobilize her cultural and linguistic capacities to explore modes of support that better align with parents' capacities. For example, she noticed how Carla, a recently immigrated 8 year-old Mexican girl, was deeply struggling with school. Rather than sending emails or messages through apps, Yaritza contacted Carla's mom on the phone to discuss and *negotiate* possible actions for Carla. Yaritza described this experience: “I asked her if Carla could attend after-school remediation classes and she refused. They don't have a car, and so she could not pick Carla up from school. I then offered to drop Carla at home myself and the mom accepted right away.”

Both Dianne and Yaritza enact deep care towards Latino children and are willing to



use resources (*e.g.*, an interpreter, technology, their native language) to support parental engagement. However, neither their care nor their ability to convey information to parents (even when it is in parents' native language) are enough to align with parents' capacities to engage. It is having information about parents' everyday contexts what can allow teachers to understand parents' limitations and align their capacities so that parents can turn their limitations into opportunities.

### **Bilingual Parent Liaisons**

The bilingual parent liaison's duty is to help teachers' understand parents' everyday context, and to help parents understand the school environment. In ANT's terminology, liaisons are expected to act as *mediators* who "transform, translate, distort and modify the meaning of the elements they are supposed to carry" [190]. However, the demand for highly-developed information-, technology-management, and social skills drives most liaisons to act as only as *partial*—rather than *full*—mediators, only transferring information between actors, without fully understanding their capacities and limitations.

Chabela has been working as a middle-school liaison for the last two years, and is still becoming familiar with the school. Her immigration experience from Chile to the U.S. was different from that of the parents she serves, and she struggles to understand the complexity of these parents' realities. Interested in helping, but aware of her limitations, Chabela only feels capable of acting as a *partial mediator*, who transfers information, almost verbatim, from one source to the other. To do this, she relies on technology. For example, she uses Remind to send news about school events to all 500 Latino parents, translates newsletters and announcements that are later posted on the school's website, and makes phone calls to parents on teachers' requests to let parents know about their children's behavioral and/or academic issues. Although she does try to use her short interactions with parents to learn more about them, her still preliminary understanding of the school and parents impacts her ability to offer the support necessary. For example, she organizes events at school (such as ESOL workshops) that very few Latin\* parents (roughly 8 parents in a school with over

500 Latin\* students) take advantage of.

Veronica has been the bilingual liaison of a 95% Latin\* elementary school for 10 years. Her extensive experience with the community, mixed with her people skills and eagerness to expand her social network gives them many capacities to act as a *full mediator* between parents, schools, and the community outside the school. Like Chabela, Veronica relies on technology to push school-related news to all parents (*e.g.*, reminders about school events). However, to foster an information exchange that aligns with parents' realities, she aligns with parents' capacity of sharing information via close, informal interactions, always organizing several meetings and activities that allows them to feel comfortable conversing and developing ideas for addressing their particular needs. For example, Veronica periodically meets with resourceful parents like Rita to discuss the information that the community as a whole could be interested in. For trusting parents like Elena who find it hard to be at school, Veronica manages outside-the-school community resources (*e.g.*, donations from restaurants, volunteers from churches) to facilitate attendance. She explains further: "I usually organize dinner or lunch meetings at parks close to where Latin\* parents live. I have also invited parents to movie nights with their kids where we first talk about school-related topics." Events such as these also address the situation of insecure parents like Monica, who need to share their concerns with others.

The cases of Chabela and Veronica suggest that liaisons can play an essential role in the creation of the equitable parent-school communities that [53] proposes, but they need to align with many other community actors to attain their information goals.

### **Other Parents**

The third and final actor in the schooling environment that I discuss is the network of *other parents*. I identify actors in this network in terms of two groups of parents I saw coexisting in the schooling environment: *English-speaking*, and *Non-English-speaking Latin\** parents. Katie, a U.S. American, and Alba, a bilingual Venezuelan immigrant, are an example of *English-speaking* actors. The two of them met during school events and children's

birthday parties, and are now part of a group of parents who see each other regularly for play dates. Whenever they see each other, they have little trouble aligning their interests and capacities for exchanging information about summer camps/after-school options for their children. Given cultural, linguistic and often class-related clashing interests, parents like Katie and Alba rarely interact with *non-English-speaking* parents like Rita, Elena, and Monica. Since Rita and Monica—the resourceful and insecure mothers I described in a previous section—are able to be at school more often, Katie and Alba do recognize them and have even tasted Rita’s *enchiladas* during International School Night. However, not even Alba, who speaks Spanish natively, has conversed with these parents; given that she speaks English, she is not part of the meetings that the school liaison organizes for low-income Spanish-speaking parents. In the case of Elena—the trusting mother previously mentioned, her lack of physical presence at school decreases even more her chances of meeting these English-speaking parents. Resourceful parents like Rita often feel that *non-English-speaking parents* are not a cohesive group either. She further explains: “We are all in the WhatsApp group Paula [the liaison] created but most never come to school. Look now! Only 5 of us are here, where are the rest? They just don’t see that the only way we can change things around here is by being here.” Prior studies of nondominant parents have shown that sharing information among parents can increase their knowledge of learning opportunities and educational media for their children [53, 63, 220]. The accounts of these parents reveal, however, that the schooling environment offers little opportunities to non-English-speaking Latin\* parents for establishing alliances with other parents that can foster such exchanges; these parents struggle to connect even with those of their same ethnicity, language and socioeconomic status.

### *The Larger Community*

As seen in the case of Rita and Elena—the resourceful and trusting mothers previously mentioned—many parents access information by forming alliances with members of the

larger community outside their schools and homes. I see this larger community as comprised of three kinds of actors: those belonging to parents' *close relations*, *supporting organizations* providing a wide range of services (including educational), and *everyday people* who are—socially speaking—most distant from parents but can provide extremely diverse and novel information.

**Close Relations** Extended family, neighbors, co-workers, and Latin\* businesses (*e.g.*, cellphone shops, cab companies), all form a network that aligns extremely well with parents' information-sharing capacity of accessing information relevant to their context during close, informal conversations [221]. This network's alignment helps to motivate parents in using technology for novel purposes [44]. This study's data highlights the potential of this network to also offer parents resources/information for impacting their children's education.

Like Elena—the trusting mother previously described, many parents form stable alliances with this network for navigating their children's academic needs. As Barbara explained, technology can expand access to this network: “When *de plano se nos cerró el cerebro* [our brains cannot find a solution], I tell *la niña* to phone call her brother to see if he can help, and she sends him a picture of her homework”. This network can also be convenient to keep parents updated on school life. For example, Barbara relies on spontaneous encounters with friends at work whose children attend the same school: “We always keep each other posted on school news, like asking ‘Did they let you know [about a school event]?’, ‘Are you going?’” This information channel can also convey other kind of parental engagement information, such as free after-school and daycare options close to parents' homes.

However, this study's data shows that, given this network's ability to help its members resolve everyday issues, it is better suited for providing information for *indirectly* broadening parents' access to education-related information. Sofía, for example, found out about Groupon through a co-worker, and used it to find a summer camp for her daughter. Julia's

neighbor told her about a Latino cab company that she now trusts to attend school with her children. Lucía was able to bargain for a new cellphone at a Latin\* phone shop where she could later install school-sanctioned apps. These nuances suggest that to harness close relations for supporting children's education—as [24] suggested—technology design could do more to diversify the information about learning that this network manages.

**Supporting Organizations** The growth of the Latin\* immigrant community I studied has fostered the creation of supporting organizations specifically targeting their needs. These organizations' bi-cultural and bilingual nature, as well as their large social capital, makes them key mediators of information between families and the U.S. American population at large. I noticed three types of organizations based on their goals and capacity in terms of information dissemination. *Open organizations*, such as Solidaridad—the oldest, largest NGO working with Latino immigrants in the location I studied—offer a wide variety of services (*e.g.*, legal, health, economic, and education), and have no restrictions in their capacity to serve families. Solidaridad's large, open nature, makes it an obligatory site to visit, not only for immigrants but for other, smaller NGOs that use it as an information hub for advertising their services. This organization, thus, has the potential to form stable alliances with parents for they can convey a wide variety of rich information that fit their interests and everyday needs. However, the quantity of information it manages clashes with parents' capacity to access and make sense of information in close interactions. Parents often miss the channels for finding the right information about learning resources at the right time. For example, Elena—the trusting mother previously mentioned—visits Solidaridad once a year to get help in filling out health insurance application forms for her children. The last time she visited, a *señorita* gave her and other parents waiting a talk about Hermandad, an after-school program for Latin\* children. Elena, however, missed the information desk with brochures from other NGOs, including the ones from Más Ciencia, explaining college financing options for Latin\* children. This information could have helped Elena broaden the opportunities she envisions for her 16 year-old daughter's academic future.

In contrast with Solidaridad, Hermandad and Más Ciencia are *specialized organizations* working towards improving the educational attainment and opportunities of Latin\* children. Both offer after-school programs, the first providing children with academic support, and the second expanding children's experience with Science, Technology and Mathematics. It is precisely their particular focus on children's education and their small size that enables them to offer services addressing what they perceive are parents' urgent needs. For example, after the staff at Hermandad noticed some children falling asleep during class time, it offered a workshop for parents to learn more about appropriate sleeping hours. Hermandad has also offered workshops based on parents' expressed interests, like avoiding bullying and promoting self-esteem among children. However, it is rather these organizations' capacity for sharing information in culturally- and linguistically- appropriate ways that enables them to form alliances with parents. Dayanara, Más Ciencia's program coordinator, further explained: "When we have an event, we call them [the parents] several times, many months in advance, first to know how they are doing and then to remind them about the event. To our people [referring to Latin Americans] such care shows we respect them and want them to be included." Despite these organizations' ability to form stable alliances with parents, their specialized nature limits the number of students and parents they can serve.

Finally, *religious institutions* like Alianza Religiosa are similar to organizations like Solidaridad, for they are large and open to the public. However, the power of these institutions relies on their ability to quickly mobilize their resources to attend to families' needs and concerns given the large, ready-to-act body of volunteers working with them. Alianza Religiosa's volunteers, for example, offer computer workshops and one-on-one literacy classes to parents who seek to learn. Having parents taking these classes could have an impact in their parental engagement practices. The news about these services, however, rely on word of mouth only. While this information-sharing capacity does align with many parents', it tends to limit the number of parents it can reach.

This study's data suggests that supporting organizations have enormous potential to foster a partnership across different community actors for supporting parental engagement: they are all highly-connected institutions that promote and leverage closeness to help parents broaden their ideas of what is possible and needed for their children's academic lives. However, these organizations need help in facing particular limitations (*e.g.*, overload of information, limited resources, etc.), hindering their ability to reach parents in need of this information.

**Everyday People** The last group of actors in this category are the *everyday people*, who are neither actors of parents' close networks nor of supporting organizations. The alliance between parents and this network tends to be unstable; parents have few opportunities for meeting people outside of their close relations and language and class-based gaps tend to make parents fearful of accessing larger, socially-distant networks [13]. The resourceful mother previously mentioned, Rita, explained how she experienced class-based apprehension towards those who speak her same language, preventing her from fully mobilizing her information-sharing capacities: "those Latin\* [Spanish-speaking] who are a bit better [economically], usually behave as if they were better than us, and end up being dismissive. I don't feel comfortable talking to them sometimes." This study's data suggests, however, that the network of everyday people offers richer opportunities to diversify parental engagement practices than close relations. Mariana, for example, learned that she could access soccer classes for her son at the YMCA because the Latin\* doctor seeing him recommended it. From there, she was able to access other YMCA services such as parenting classes. Sofía, on the other hand, learned about Más Ciencia from a professor she cleans houses for. These examples suggest that more can be done to augment the possibility for parents and everyday people to form stable capacity-based associations that promote meaningful exchanges of information.

## *The Technology*

Technological actors play an integral role in mediating the information exchange taking place in parents' information network. In this category, we include not only devices that enable information transfer (*e.g.*, smartphones and desktop computers), but also apps, digital content (*e.g.*, videos), and infrastructure such as the internet. I describe these technologies as enacting two distinct roles based on their context of use: everyday and school-related technologies.

### **Everyday Technologies**

In line with digital equity studies on Latin\* technology use, I found that smartphones are an everyday technology for Latin\* families [33, 101]. In most of this study's participant families, each member—including children—owned a smartphone with unlimited data access. Parents of these families had been using cellphones for over a decade. The ways in which parents formed alliances with this non-human actor, however, was highly impacted both by the agency embedded in the design of the smartphone (and its apps) and its context of use. In the case of smartphones, their small size, personal nature, and ease of use make it an item individuals feel safe manipulating and harnessing in ways they want, like, and need [222]. Like other users from nondominant groups in the U.S. and beyond, this study's parent actors aligned with these affordances to access diverse forms of entertainment and engage in one-on-one communication with close relations [44, 104, 223]. In addition, this study's data confirms previous findings on how Latin\* immigrants perceive certain mobile technologies as a connection with their new world [44, 131]. Adriana, for example, prefers to buy smartphones "because those let me practice English more, especially when I am at work, with the translator, you know?" Parents like Mariana and Niurka take this notion further and venture to explore new apps and content for improving their English skills: following a co-worker's recommendation, Mariana is using Duolingo, and Niurka commonly searches for YouTube videos that teach English to Spanish-speakers. The agency embedded in mobile apps also shapes how willing parents are to form alliances with these ICTs.



This study's data suggests, for example, that parents' interpretation of ICTs' moral values can hinder their use of public social media platforms such as Facebook, which have much potential for supporting information transfer. Mariana, for example, explained how she perceived Facebook:

*Through Facebook I found Solidaridad's and the Mexican consulate page. Besides, it suggests pages I really like, with prayers and images of God. I just don't like that it often shows me people posting too many pictures of themselves or commenting in others' posts things that they should say to each other in person.*

When the public aspect is minimized, however, this study's data suggests social media apps have a higher chance to foster community-building. Emilia, for example, belongs to a WhatsApp group initially created by a parenting program she attended that has now turned into a go-to group for sharing parenting concerns. For Niurka, the private Facebook group that Hermandad created for parents is also a safe place where she feels free to interact with the program coordinator and other parents. All these accounts suggest the relevance for designers to understand how certain ICTs can clash with parents' capacities to act towards moral goals, thereby hindering information transfer.

Another app that the larger community often resorts to as an everyday technology is email. Email's capacity to act as a medium for quickly reaching a large number of individuals have turned into the 'de facto' medium for disseminating all kinds of information [224, 225]. Although I also saw that parents acknowledged the value of this non-human actor—driving them to have at least one email account in the family, this study's data reveals the alliance between educational institutions and email's attributes as highly misaligned with parents' communication strategies. Schools, for example, propose email as the main medium to reach Latin\* families on an everyday basis. However, given the rare occasions parents receive information they consider vital through this medium they do not see the need to engage with this technology frequently. In Ximena's case, dismissing email's ev-

everyday relevance led her to miss a school notification about her son's recent detention.

As the above cases show, everyday mobile technology enables opportunities to connect parents with the resources they need [33, 44]. However, attention is needed to select a communication medium that aligns with parents' everyday capacities to communicate.

**School-Related Technologies** Schools have allied with technology as a key actor not only in the classroom but also in how the school, teachers, and staff communicate with parents [53]. This study's findings describe in detail the two different roles technology fulfills in the schooling environment and the state of the associations it forms with parents, teachers and liaisons. First, there is technology that mediates parents and *classroom-related* content such as the topics children are learning, children's academic performance, and classroom behavior. Second, technologies act as media to carry *institution-related* information (e.g., changes in school calendar, school events) to parents.

Teachers usually form associations with different technologies to work towards sharing *classroom-related* content with parents so that they can have enough information to act when needed. Dianne—the information-publishing teacher I mentioned before—frequently recommends parents online educational technologies that children can use at home to practice classroom content (e.g., Accelerated Reader, Dreambox, Raz Kids, and ABCYAs). For children in higher grades, she also shares information about free at-home internet and recommends places to buy desktop computers. Parents like Andrea follow her suggestion, but choose not to further engage with those technologies, thus missing opportunities to get involved in their children's progress: "I honestly only got it [the desktop computer] so that the kids could do their homework. The guy who set it up told me I could do a lot of things with it, but since I don't ever use it, I have no idea what is in there." Andrea's case confirms that parents do see the educational value in these technologies [44, 63]. However, when confronted with the possibility of using these technologies themselves, it becomes harder for parents to see how the attributes embedded in these technologies are aligned with their everyday goals and parenting capacities. For example, it is not clear to parents how sitting

down at a computer to play these apps with their kids can inform them about children's academic progress.

Teachers have also formed alliances with parent-classroom communication technologies such as ClassDojo, Seesaw, Parent portals, and weekly newsletter emails, all of which keep parents updated on kids' activities in the classroom, including learning experiences, children's academic performance, and behavior. While most of this study's participant parents were not likely to engage with email-conveyed information, some of them did consider other teachers' recommended apps. However, this study's data highlights that these technologies' emphasis on reinforcing a one-sided communication paradigm—from teachers to parents—tends to hinder how parents interpret these technologies' attributes, and thus, form alliances with them. Carmen, the mother of a kindergartener, checks ClassDojo—an app for teachers to post pictures of the class and report on children's behavior—quite frequently. Given that nobody has explained to her what this app is for, she has concluded that it reflects her son's entire performance in the classroom. She explained how she was using this technology: “I noticed the teacher was taking points away from his *nota* [general score], so I punished him taking away toys and videogames”. Later, the teacher explained to her that those points were taken from the entire class because they were being too noisy, and that Carmen's son was actually doing really well at school. While resourceful parents like Rita would not be highly impacted by such misunderstandings, for trusting parents like Elena, misconstruing the purpose of an ICT could lead to an inability to mobilize her information-seeking capacities on time. For insecure parents like Monica, such incidents could augment levels of insecurity and mistrust towards teachers. Information fragmentation is an important factor hindering parental engagement [226]. This study's findings indicate lack of clarity in technologies' purpose is another important limitation to overcome.

As the parents in [44], many of this study's parent participants found it easier to engage with their children's academic progress by forming alliances with everyday technologies.

When Barbara's daughter needs help with homework, Barbara takes a picture of the homework with Google translator. Then, when she knows what the homework is about, she uses some phrases from the homework instruction to search information on the topic. In the meantime, her daughter also searches information—in English—on her own cellphone. Such active engagement with the content their children are learning allows parents to develop a clearer idea of what needs to be done. In Barbara's case, she now knows that her daughter needs help with Chemistry. However, this study's data also highlights that, regardless of the role they enact, for many Latin\* parents it becomes a priority to work for their children to become independent problem solvers. Such as preferred strategy of action leads to act only when the child expressed a need for help and mostly seek for supporting resources such as the help of relatives and friends.

The ability of online technologies to present information in centralized sites where individuals can quickly access and navigate it, has offered schools efficient media for disseminating institution-related information (*e.g.*, events, forms to be filled out, changes in school calendar) online through newsletter emails, websites, and Facebook pages. As Chabela, the partially-mediating school liaison previously mentioned, explained, schools put much effort into publishing all information online, both in English and Spanish. However, as she admitted, publishing information in Spanish is not enough: "It is just too much information, often mixed with information in English as well, cause these sites are all bilingual. They [parents] don't read it. I've asked around and most parents do not even know we have a website." Eager to form more stable alliances with parents, most school liaisons have created other digital information channels that they moderate to, again, ensure a one-sided communication paradigm. Messaging apps like Remind or private social media like WhatsApp, where liaisons can send snippets of information—usually with images—in Spanish only, have had higher chances to form alliances with parents' strategies for processing school information. The closeness and familiarity these apps afford align better with parents' accumulated cultural capacities. Given liaisons' moderation of these spaces,

these channels' potential to act as community-building platforms has yet to be explored.

As this study's data show, parents' capacities do entail strategies for attaining informational goals around school-related topics. However, the technologies that schools and teachers align with to keep parents informed do not meet parents' particular information goals. This study's findings suggest a great potential for expanding the abilities of everyday technologies to address parent-school information exchange strategies and needs.

#### 4.2.5 Assets in the Ecology: Design Challenge and Opportunities

Using ANT allowed us to grapple with the complexities of the parental information network I studied. In particular, it shed light on the goals, capacities, and strategies of all actors in the network, the efforts these actors invest into aligning their goals and capacities, and the reasons why they succeed or fail at it. I now discuss how an ANT-motivated understanding of reveals pending challenges for technology to intervene as well as potential pathways for design to overcome such challenges.

##### *Design Challenges: Clashing Goals and Capacities*

Our data analysis highlighted three groups of parents' goals, and thus, of the capacities actors enact, that clash in the network: everyday (vs. institutional) goals, meaningful (vs. abundant) information-management strategies, and personal (vs. detached) interactions. I now discuss the role of non-human actors in these unstable alliances, thereby uncovering pending challenges for technology to effectively support information flow in the network.

##### **Everyday vs. Institutional Goals**

Our data shows that Latino immigrant parents tend to have an aloof response both to classroom management (*e.g.*, Parent Portals, ClassDojo) [102] and educational technologies (such as ABCYA and Raz Kids). Our ANT approach suggests this is due to these technologies' strong misalignment with parents' everyday goals. Teachers and schools choose these technologies because they align with their educational purposes (*e.g.*, teaching

a math curriculum and informing parents about children's behavior), and with the schools' value system (e.g., keeping information private). However, parents struggle to see value in such purposes and end up disengaging from these technologies; they sometimes forget or even misinterpret these ICTs' purpose, disregard installing them, or make someone else responsible for them. A pending challenge for technology, thus, is to be able to respond to specific school-related purposes, values, and norms, while also eliciting in parents a desire to engage.

### **Abundant vs. Meaningful Information-Management Capacities**

Beyond the traditional home/school contexts where Latino immigrants have been studied [33, 44, 45, 101, 131], our data highlights the larger community (e.g., supporting organizations, everyday people, and parents' close relations) as a key, but largely untapped source of learning resources for parents. This network's instability is due to a misalignment between the goal of members of the larger community to share information at scale and parents' strategies to consume information that resonates during close interactions to make sure that the information accessed meets their circumstances and aspirations. Further, the technologies that some actors of this network (e.g. supporting organizations) use to send information out to parents (e.g., flyers, newsboards, and websites) reproduce this misalignment by not contextualizing how information can fit parents' present constraints (e.g. financial), or serve their aspirations (e.g., "*how can a robotics club help my child's future?*"). A pressing challenge for technology, thus, is to explore how to harness abundance information so as to deliver it in ways that respond to parents' contexts and aspirations, minimizing parents' sense of confusion or distrust.

### **Detached vs. Personal Interactions**

Our data reveals that, in the context of immigrants, school-related technologies enforced as unidirectional communication channels (e.g., Remind, WhatsApp groups, ClassDojo) perpetuate the already existing misalignment among school actors [53]. While on the surface it would seem as if these technologies at least allow information to flow, our

ANT approach suggests that detached interactions hinder teachers' ability to understand how to route information that effectively attends to children's contexts (e.g., deciding what information to deliver to a mother who quit her job to help her child). Further, the unidirectional communication paradigm also keeps immigrant parents disconnected from other parents. Technology designers could explore if and how technology might help establish methods for strengthening personal—rather than detached—interactions among actors in the parental engagement network so that all actors can engage in richer, more fruitful information exchanges.

### *Design Opportunities: Promising Alliances*

In addition to highlighting tensions, our ANT analysis revealed promising alliances in the parenting actor-network of Latino immigrants. Below I discuss how instances where actors' goal and capacities do align can illuminate potential opportunities for technology design.

#### **Designing to Engage, not Impose**

To design parent-school technologies that parents find engaging—rather than imposing—I propose to learn from the stable alliance parents hold with everyday technologies. Our ANT analysis showed parents preferred these technologies because they align with their everyday activities (e.g., finding a place in Google Maps) as well as with their capacity to learn about their host country (e.g., learning English in Duolingo and Google Translator). A way to increase parents' engagement with parent-school media, thus, could be to enhance everyday technologies so that they can provide support to parental engagement practices. For example, Google Translate could be augmented to help parents learn more about homework materials; it could keep track of the words being translated and, when determined that these words are likely to refer to homework terms, suggest possible learning resources for parents to check out with their children. Another possible design pathway could be to redesign existing parent-school technologies to introduce interactions that align with parent's everyday goals and aspirations. For example, ClassDojo could be modified to fit parents'

daily information-management strategies by forwarding messages and notifications to the private communication channels that parents already use (*e.g.*, text messages, WhatsApp). Further, Parent Portals could align with parents' aspirations by offering information about the cultural relevance of a particular homework/reading.

One issue to consider in the process of forming new alliances in the schooling environment would be the feasibility for major everyday technology companies such as Google and/or Facebook and schools to work together. It would also be important to explore the willingness of schools and teachers to provide content that is better aligned with parents' interest (*e.g.*, content that helps parents draw cultural connections their kids' school activities [227]).

### **Generating Meaning at Scale**

To enable the larger community to deliver learning-related information that parents find meaningful in terms of the capacities it can support, I propose to learn from stable alliances that parents form with the larger community for the purpose of transferring various kinds of non-educational information (*e.g.*, coworkers recommending Groupons, or parents finding about health insurance through 'supporting organizations'). Our ANT approach highlights these alliances are successful due to (1) the trust that these community actors elicits in parents and (2) these actors' ability to quickly and accurately respond to parents' information-seeking goals. Technology could replicate these traits when delivering learning-related information. For example, intelligent agents working on trusted communication channels (*e.g.*, WhatsApp groups with schools) could curate information from the larger community and offer it to parents in the form of timely, digestible suggestions. These agents could also converse with parents to address doubts, provide contexts and anticipate needs.

Introducing intelligent agents to form associations with parents and the larger community, however, poses questions of privacy and trust that would require further exploration. These technologies would also require to further understand the motivation for the larger



community to enter information in systems outside their responsibility. Finally, the deployment of these ICTs would need designers and other stakeholders to negotiate how the data is gathered, and who should be made responsible for gathering and curating that data.

### **Personalizing Detached Information**

Our ANT analysis suggests that technology could support more personal interactions in the school environment by drawing from the effective alliances between parents and school staff. The connections taking place between *negotiating teachers* and *trusting parents*, for example, highlights the possibility for technology to create spaces that support parents' capacity to exchange rich, contextual information with teachers and liaisons. As our data suggests, this information would need to address limitations and opportunities that are part of their everyday lives (*e.g.*, current job situations, transportation limitations, or the supporting groups parents resort to for handling school projects). To help parents feel comfortable sharing family information and thus equalize the power dynamic, ICTs could give teachers the chance to also share personal information (*e.g.*, favorite books, interests, and hobbies). Further, these ICTs could also foster parent-to-parent meaningful exchanges, especially for connecting non-English speaking parents to bilingual ones. The stable alliance observed between *fully-mediating school liaisons* and parents suggests ICTs could also be designed to support more school liaisons into becoming *fully-mediating school liaisons*. For example, ICTs could facilitate online communities for liaisons to share ideas for creating effective offline parent-school interaction spaces.

The design of these new technology actors should explore how to motivate teachers and parents to share personal information with each other, considering their time constraints and privacy concerns. Additionally, it would become key to explore how issues of classism—which our data highlights as prevalent in the Latino immigrant population—could affect online interactions in community-building platforms. Finally, technology designers would need to find technology platforms that respond to schools' regulations with regards to privacy and security.

### 4.3 [Study 3] Bilingual Parent-Education Liaisons: Unpacking Design Possibilities in their Assets-Alignment Work

#### 4.3.1 Introduction

Study 2 (S2) revealed that bilingual parent-education liaisons are key actors in Latin\* parents' ecology of engagement. From a view of assets as cultural capacities—cultural and historically-accumulates strategies that people use to attain everyday goals [55]—and of a parental ecology as an ecology of information [156], liaisons can be seen as key species in the ecology, doing critical capacity-alignment information work. These key species are constantly leveraging their capacities to create and maintain information services that, in transforming the gaps between actors into alignments, aim at benefiting parents [228]. Understanding liaisons' efforts and envisioning ways to further support them, thus, becomes essential for any assets-based technology-enhanced initiative. To attain such an understanding, I explored the following questions:

- *RQ1* What parent-education information services bilingual parent-education liaisons offer by aligning the assets of multiple actors supporting Latin\* immigrant parents in the U.S.?
- *RQ2* What are key resources enabling the assets-aligning, information work of bilingual parent-education liaisons supporting Latin\* immigrant parents in the U.S.?
- *RQ3* What are the opportunities and challenges for parent-education ICTs to amplify the assets-aligning, information work of bilingual parent-education liaisons supporting Latin\* immigrant parents in the U.S.?

To analyze liaisons' work, I drew inspiration from the analytical lens of stitching suggested by Vertesi [191]. Recognizing that information goals often entail aligning multiple technological platforms, Vertesi proposed this lens to illuminate the details of such artful,

alignment—or stitching—work. In this study, I extend Vertesi’s lens from technical infrastructures to sociotechnical systems. In analyzing liaisons’ stitching work across diverse socio-technical systems, this study sheds light on liaisons’ particular system-alignment capacities and possible paths for parent-education technologies to augment them. Further, in demonstrating Vertesi’s lens as an analytical tool for unpacking mediators’ assets to bring sociotechnical systems together, this study further contributes to HCI’s understanding of assets-based design in large-scale systems.

#### 4.3.2 Background: Bilingual Parent-Education Liaisons

As described in Chapter 2 2, different school districts and nonprofit organizations have engaged in various initiatives to support their immigrant population. Bilingual parent-education liaisons are one of those initiatives. In the case of school districts, federal programs like Title III enable schools to hire staff that can act as language translators and cultural liaisons between parents and schools [89, 90]. For nonprofits working with Latin\* immigrant families across different programs, including educational ones, these liaisons are essentially staff hired to coordinate and run such programs. Independent of their institutional background, parent-education liaisons must learn to operate in between different social and technological systems, including teachers, school staff, parents, and other actors, making sure they all work to open information channels for the benefit of Latin\* families.

During Study 2, it became apparent that bilingual parent-education liaisons are a crucial support structure for immigrant families. From an immigrant background themselves, [56, 229, 230], liaisons are then in a position where they could educate teachers and administrators about parents’ cultural realities and empower parents to become advocates for themselves and their children. Their position as an intermediary between different worlds allows them to develop a critical awareness of the educational, cultural, and emotional capacities and needs of each one of these actors. This, in turn, enables liaisons to mobilize their own capacities for putting together information-based services that transform infor-

mation demands into useful knowledge for benefiting immigrant families. In this third study (S3), I explore the particularities of these liaisons' work as well as the potential for technology to amplify their capacity-oriented actions they were doing to support parents' information management.

#### 4.3.3 Related Work: HCI and Information Mediators

Bilingual parent-education liaisons act as middle persons in between diverse socio-technical worlds. HCI-related literature has referred to those actors performing the role of middle persons in different ways, depending on what aspects of their activities they describe. From an Activity Theory perspective, HCI has seen middle persons as people who facilitate intermediated interactions between end-users and tools (often technology) [231, 232]. In contrast, for Latour there are two different types of middle persons depending on the presence or absence of agency in their practices. Intermediaries are black boxes that transfer an input to an output without changing it; they are mere conductors of information. Mediators, on the other hand, transform inputs and generate multiple outputs. However, middlemen can switch between roles over time or under certain conditions. As such, they are able to act as critical nodes in a network, establishing and maintaining links between worlds via the creation, sharing, transformation, and use of knowledge [233]. In this study, I see bilingual parent-education liaisons as mediators. Seen from from the point of view of those who interact with liaisons, these are not only a black box; it is their agency what motivates other actors to keep going to these liaisons for support.

The fields of CSCW and HCI have a long tradition of studying both intermediaries and mediators, working in between worlds. Working in circumstances pervaded by resource constraints, Information and Communication Technologies and Development (ICTD) research, for example, has extensively explored the technology intermediary [234, 235, 236, 237], whose service is to intervene “when the primary user is not capable of using a device entirely on their own”[232]. When looking at information mediators, work on CSCW has

tended to put an emphasis on mediators operating in contexts that heavily restrict the nature of the services they can provide (e.g., mediating e-government online services [238, 239], supporting staff at telecenters [240] or digital libraries [233], and children seeking information for parents [27]). This body of work has focused on mechanisms that information mediators use to ensure that those they assist—also referred to as clients [233, 238, 239]—can access and make sense of information. Some of these mechanisms entail defining information queries for clients [233, 241], developing technological abilities [239, 240], and educating clients to become information-seekers themselves [233, 238], and government workers working across Twitter to push notifications during times of crisis [242]. This work’s general assumption—with few exceptions [239]—has been that mediators operate when clients approach them with specific requests and that mediators offer only one type of support—also referred to as service [27, 232, 233, 236, 239, 240, 241].

Using the case of liaisons, in this study (S3), I explore the work of information mediators who (1) offer multiple information-based services to multiple clients; and (2) must make additional efforts to convince their clients to use their services. Examining the work of liaisons as service providers, I describe the resources and capacities that liaisons must leverage to maximize other ecology actors’ access and use of information. Further, I explore the tensions and challenges this type of mediator can face when serving multiple clients from different backgrounds.

#### 4.3.4 Theoretical Lens: The Analytical Language of Seams

To examine liaisons’ capacity-oriented mediation work, I draw inspiration from Vertesi’s analytical vocabulary of *seams* [191]. Focusing on physical and digital infrastructures, she proposed this language for understanding “how and where actors make connections and bring disparate elements together” for operating in multi-infrastructure environments. Vertesi posits that, in these environments, infrastructures (e.g., *Facebook*, *Twitter*, Phone 3G coverage) often lie in a messy overlap with each other. Drawing on critical studies

on Ubiquitous Computing [243, 244], she explores the gaps between these infrastructures (the infrastructures' seams). Infrastructures, she explains, are often designed to make their seams invisible, providing a seamless experience to individuals moving across these systems. In practice, however, the seams are exposed, producing a seamful experience where incompatibility and limitations remain a central part. For Vertesi, it is how individuals react to the seams—that is, their capacities—what becomes essential to understand when looking at multi-infrastructure situations. In particular, she proposes to look at how, instead of seeing seams as problems, people creatively use them as opportunities to align a fleeting multi-infrastructure patchwork for meeting information needs.

In this study, I argue that liaisons also operate in a heterogeneous, messy environment. Instead of operating across multi-infrastructure environments, however, liaisons work in the middle of multiple, nonconforming social and technical *worlds* (e.g., that of Latin\* and U.S. American parents, teachers, school staff, communication technologies, and so on). Similar to the infrastructures that Vertesi describes, these worlds lie in a messy overlap with each other, with their seams visible between many edges (e.g., the worlds of parents from different ethnicities and origins overlap at schools, with cultural, linguistic, and socioeconomic differences at their seams). To analyze liaisons' work, I thus adapt Vertesi's language of seams from a technological to a fundamentally social domain—such as the educational environment. While exploring liaisons as *boundary objects* across intersecting social worlds [245] may have been an option of analysis, such perspective ran the risk of disregarding liaisons' agency and creative work when bringing worlds together. By holding the focus on systems' seams instead, Vertesi's lens enables three analytical opportunities for understanding the multiple information-services that mediators in a large-scale system offer to multiple clients, including the capacities they mobilize and align throughout. First, it helps uncover liaisons' struggles and points of mastery—or capacities—as they assemble multiple services for helping their clients to overcome seamful experiences. Second, it unearths the many services that liaisons assemble, including those often invisible to insti-

tutional actors. Finally, it reveals challenges and opportunities for harnessing the seams of existing worlds via technologies and, from there, to further support liaisons' work.

#### 4.3.5 Methods

In this paper, I analyze the collaborative, information work of 16 liaisons recruited as part of a larger, 2.5-year multi-sited ethnographic fieldwork. The goal of that research engagement has been to explore possible roles for technology in supporting Latin\* immigrant parents as they access and make sense of learning-related information. The fieldwork took place across 16 locations in the city of Atlanta, U.S., and has included the participation of over 300 parents as well as other actors like teachers, and members of supporting organizations. As our participant parents increasingly highlighted liaison's key role in providing resources to support their children, I realized there had been little research on liaison's role and decided to give a more in-depth look at this particular actor. I recognize that the analysis offered—stemming from liaisons' situated knowledge—tells one-side of a complicated story. I have tried to minimize such risk by juxtaposing liaisons' experiences with other actors' accounts collected throughout the larger study.

Table 4.3: Details of liaisons' gender, age range, nationality, and organizations (all names are pseudonyms).

<b>Participant</b>	<b>Gender</b>	<b>Age</b>	<b>Nationality</b>	<b>Organization</b>
Mariela	F	45-50	Ecuador	Elementary School
Inés	F	35-40	Venezuela	Elementary School
Gabriela	F	35-40	Colombia	Elementary School
Marisa	F	35-40	Bolivia	Elementary School
Dianne	F	35-40	United States	Elementary School
Gisela	F	45-50	Puerto Rico	Elementary School
Chabela	F	45-50	Chile	Middle School
Mireya	F	45-50	Colombia	Middle School
Tara	F	45-50	Honduras	High School
Ernesto	M	35-40	Puerto Rico	Parenting Program
Mayra	F	45-50	Venezuela	Parenting Program
Juana	F	20-25	United States	Parenting Program
Deborah	F	30-35	United States	After-school Program
Diana	F	35-40	Cuba	After-school Program
Alicia	F	35-40	Dominican Republic	After-school Program
Morelia	F	45-50	Mexico	School District

I recruited 16 liaisons at 14 of the 16 locations of our multi-sited ethnographic fieldwork. Locations included eight Title I schools, the ESOL (English to Speakers of Other Languages) department of a school district I will call Lakeside, and five NGO (Non-governmental organization)-run educational programs (three after-school programs targeting children and two programs targeting parents). Participant included 9 school liaisons, Lakeside's head of bilingual liaisons, 3 liaisons of after-school programs, and 3 liaisons of educational programs for parents. All recruited liaisons are professionals from different countries of origin, with a minimum of a bachelor degree in different specializations (*e.g.*, psychology, education, industrial management, and business). All of them have over four



years working as liaisons, in-depth knowledge of the school community, and use basic office software and social media. The majority are female (14 of 15)<sup>4</sup>, speak Spanish either natively or as a second language (14 of 15), and are of ages ranging from 25 to 48 with an average age of 39. Recruited liaisons serve from 120 to 600 parents with an average of 300. The parents served are from a low-income background; most are from countries like Mexico, El Salvador, Guatemala, Honduras, with fewer from Venezuela and the Caribbean. A detail of participant liaisons' demographics can be found in Table 4.3. Other participants and locations of our larger, ongoing study are described in [204].

This data collection process entailed four distinct time periods and a wide range of qualitative methods (e.g., semi-structured interviews, informal conversations, and participant observations). The goal of the three first periods was to acquire a holistic view of the factors enabling or hindering parents' access to learning-related information. From 1/17 to 5/17, I studied a Title I<sup>5</sup> elementary school at Lakeside district. To recruit parents who did not attend school functions frequently, I visited Solidaridad and Alianza Religiosa—two supporting organizations targeting low-income Latin\* immigrant families—and one after-school program (8/17-12/17). The accounts of parents collected in this period highlighted liaisons' crucial role in influencing parents' access to information. To further understand liaisons' work, from 1/18 to 5/18, I visited the head of Lakeside's liaison staff, four Title I schools that she recommended studying, and four NGO-run educational programs targeting Latin\* immigrant children and/or their parents.

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<sup>4</sup>The gender bias in our sample is representative of liaisons' gender at the school district I studied. The large presence of female liaisons might be due to the job's alignment with working mothers' needs. Most liaisons reported initially taking the job because it allowed them to see their children at school and take vacations at the same time their children did.

<sup>5</sup>Title I is a federally funded program in the U.S. that provides financial assistance to public schools with high numbers of students at risk of failure and living at or near poverty [246].

Table 4.4: Details of Data Collection Timeline, Locations, Methods, and Participants

<b>Time</b>	<b>Location</b>	<b>Methods</b>	<b>Participants</b>	<b>Hrs</b>
1/17 - 5/17	<b>Lakeside school district:</b> 1 elementary school (40% LS <sup>6</sup> )	Interviews	8 teachers, 1 school liaison, 9 parents	50
		<b>Participant Observations</b> 1 International night (Attending), 1 Parent-liaison session (Attending), 4 Parent-teacher conf. (Translating),	50 parents	
8/17- 12/17	<b>Across the city:</b> Solidaridad, Alianza Religiosa, 1 after-school program (100% LS)	Interviews	21 parents , 3 prog. coord., 1 prog. liaison	120
		<b>Participant Observations</b> 1 Computer Workshop (Teaching), 2 College Fairs (Volunteering)	120 parents	
1/18 - 5/18	<b>Lakeside school district:</b> ESOL department, 2 elementary schools (62% and 93% LS), 1 middle school (48% LS), 1 high school (37% LS) <b>Across the city:</b> 2 after-school programs (100%,70% LS), 2 parenting prog. (100% LP <sup>7</sup> )	Interviews	1 ESOL staff,  5 school liaisons, 4 program liaison	20
		<b>Participant Observations</b> 1 Parenting Workshop (Attending)	120 parents	
1/19 - 3/19	<b>Lakeside school district:</b> 2nd visit to ESOL department and to elementary school (62% LS), 2 elementary schools, (76%, 29% LS), 1 middle school (35% LS) <b>Across the city:</b> 2nd visit to after-school program and to parenting program	Interviews	1 ESOL staff (2nd visit), 1 school liaison (2nd visit), 2 prog. liaison (2nd visit), 3 school liaison	20
		<b>Participant Observations</b> 1 Technology Workshop (Teaching)	11 parents	

I analyzed data collected up to this point to obtain an overall view of parents' supporting structures in terms of information management and reported the results. The analysis suggested liaisons as a key point of intervention to further support parents [204]. To validate our design insights (1/19-3/19), I met with four of our former liaison participants (Lakeside's head of bilingual liaisons, one school, and two program liaisons) and concluded that: (1) to devise design technology-enhanced interventions for supporting liaisons' work, I needed to re-analyze of our data focusing on liaisons' experiences; and (2) to validate that I had reached data saturation on liaisons' work, I needed to interview liaisons with fewer resources and administrative support than those I had already studied. Guided by the head of liaisons, I interviewed three more liaisons with those characteristics. This led us to data saturation. Throughout our fieldwork, I also observed and participated with parents and liaison as they interacted across different schools and NGOs-run events. Details of our data collection sites and methods are found in Table 4.4.

Interviews with liaisons lasted 45-90 minutes and took place in participants' language of preference. The data I collected was in the form of field notes and audio recordings, which I transcribed, and translated. Following an inductive and interpretive process, and factoring the perspectives from the different actors I recruited, I coded our data thematically, identifying emerging patterns relevant to liaisons supporting tasks (*e.g.*, 'tailoring information to ensure parents act on it,' 'empowering parents to overcome their fears,' 'training teachers to understand parents'). The data under these patterns suggested that each task demanded to assemble a patchwork of selected pieces from different social and technical sources. For example, the data under 'tailoring information to ensure parents consume it' described liaisons' online and offline search for information satisfying parents' needs, their selection of technologies for crafting compelling messages, and their follow-ups to ensure that parents used the new information. To describe this assembling work, I turned to Vertesi's analytical language of seams, which seeks to understand how

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<sup>7</sup>LS: Latin\* students (foreign- and native-born)

<sup>7</sup>LP: Latin\* immigrant parents

individuals connect multiple worlds to achieve information goals. Using this language as a lens, I coded our data again, now focusing on identifying: (1) liaisons' information goals and the worlds they work with to achieve them; and (2) the seams across worlds and how liaisons harness them or fail in their attempt.

#### 4.3.6 Findings

Using Vertesi's approach, I was able to provide an in-depth account of two aspects of liaisons' work. First, I describe the main types of services liaisons are able to provide by creatively aligning capacities from the worlds of parents, technology, school staff, and supporting organizations. Second, I examine the role of technological, informational, and social capacities in motivating and enabling many liaisons' alignment work as well as the limitations that prevent other liaisons from fully harnessing these capacities. In doing so, this findings highlight how liaisons transform information, helping actors from multiple worlds to make sense and act on it.

##### *Offering Multiple Services: Different Roles, Worlds, and Goals*

Previous work on education has highlighted services that liaisons undertake to translate cultural differences between parents and schools [247, 248]. The analytical lens of seams allows us to provide an information-based view of these services, revealing the specific alignment strategies each entails. First, liaisons mobilize their communication capacities to translate information between parents, educational institutions, and other worlds. Second, they foster the sharing of lived experiences across instructors, supporting organizations, and parents, working towards the creation and maintenance of education-based communities. Finally, liaisons act as capacity aligners and builders for parents, school staff, and supporting organizations. I now describe these different services, including liaisons' efforts to assemble patchworks that can enable these services to operate as seamlessly as possible.

#### **Parent-Institution Communication**

One of the primary activities a liaison is expected to perform is helping bridge the everyday communication between their institution and Spanish-speaking parents. This entails services such as translating documents, functioning as interpreters during parent-instructor meetings, and helping institutions distribute announcements (*e.g.*, reminders that classes were canceled). Seams in their environment, however, drive liaisons to draw capacities from the different worlds they are part of to patch a communication solution. Mireya, a middle-school liaison, for example, noticed Joaquin, a 10 y/o, was too quiet during parent-teacher conferences. Unlike the school's teachers, she was able to directly ask the mother about it. After finding out the child's father had been deported, Mireya decided to take the matter to the social worker and the school counselor for devising a plan to help the child overcome a potential case of depression.

Technology is one world that often impacts how liaisons patch these sort of solutions. To convey a sense of equality to parents, U.S. schools tend to standardize the media they use for sending information, often relying on emails, Facebook groups, and websites for that purpose. This action, however, can be a detriment to many low-income Latin\* immigrant parents who tend to not use those technologies for learning about their children's education [130, 204]. For Ximena, a Mexican mother of four who I met in a computer workshop, for example, the school's decision to use email—a tool she was just learning—led her to miss a notification about her son's recent detention.

Acknowledging the seams between parents and these media, Mireya decides to patch parents' world with a non-technological option, which she has noticed aligns better with parents information-consuming capacities; she prints out school announcements in Spanish, distributes those to religious organizations, and asks the organizations' leaders to let her make an announcement at the end of Spanish services. Most liaisons, like Gabriela, complement such offline channels with their own private, Spanish-only, online ones, which they align with school-sanctioned technological platforms. She explains further,

*We have a WhatsApp group only for our parents [referring to Latin\* immi-*

*grants]. I usually send them information in Spanish about events that the school has previously announced in the newsletter, 'cos they don't read that one. Sometimes I also pass along posts from PTA [Parent Teacher Association] members on the school Facebook page requesting help for their events. When I send this information, there's more of a chance that they read it, and since they trust me, there's more of a chance they actually volunteer to help.*

Liaison-created *WhatsApp* groups were in fact one of the sources of information that the parents I talked to outside of schools deemed as extremely useful. Liliana, a Mexican mother of three that I interviewed at Solidaridad, explained to us: “We [Latin\* immigrant parents at the school] are all in a *WhatsApp* group that the liaison created. Thanks to it, I don't miss a thing [about school activities].” Both Gabriela's and other parents' accounts suggest that the autonomy to select technologies that fit the practices of non-English-speaking immigrant parents is key for the success of liaisons' communication strategies. In this way, liaisons avoid demanding new communication capacities parents. In addition, choosing communication technologies that parents use on an everyday basis, helps liaisons build and maintain trust with parents, which liaisons later leverage into greater influence on how parents use their capacities for making sense and acting on information.

### **Community-Building via Fostering the Sharing of Lived Experiences**

Mediating the communication from institutions to parents is a first step for including parents as active members of U.S. schools. However, this does not foster the two-way communication that can help parents build community with educational institutions [53, 93, 137]. Liaisons, thus, draw different capacities from the social worlds around them (*e.g.*, other parents, teachers, school staff, and supporting organizations) to assemble a multi-cultural patchwork for helping parents to interact with other actors. This is not always an easy task. Across out-of-school locations, parents told us they saw no point in attending school meetings with other parents for those were often in English, a language most of them do not speak. Indeed, due to a desire to work towards equity and inclusion, many of

the administrators of the schools I visited asked liaisons to organize all events for school parents in English, and to give translation earbuds to Spanish-speaking parents. This is the case of events like the school open house, international night, and a day for families during the Hispanic Heritage Month. Chabela, a middle-school liaison, explains how this decision impacts Latin\* immigrant parents:

*“Los padres americanos” [referring to non-immigrant, English-speaking parents] and our parents [referring to Latin\* immigrants] sit down next to each other, and I give our parents earbuds and get as many translators as needed, but there’s no conversation going on amongst them. It’s even worse, ’cos when I ask parents if they have any questions, our parents don’t raise their hands. They just don’t feel comfortable enough.*

When liaisons have the freedom to assemble spaces that are specifically for Latin\* immigrant parents, the opportunities to foster richer experience-sharing moments across actors are much higher. During our observations of a large college fair for Latin\* immigrant families that Diana, a program liaison, annually puts together, I was able to see these exchanges in action. The panelists’ earnest accounts of their experiences with U.S. schools and colleges motivated Francisco, a father who had recently immigrated to the U.S. with his family, to express his deepest concerns about his children’s future. Visibly moved by the situation, he shared his undocumented status with the audience and his fears that his decision to emigrate would curtail his children’s opportunities to go to college. Many panelists and members from the audience then rushed in to give him all kinds of advice, including specific websites to visit for information on options like high-schools’ Advanced Placement programs, and so on.

These rich moments for sharing experiences can also impact organizations trying to target Latin\* immigrant families. Thanks to Diana’s annual event, the organizations that go to her fair (*e.g.*, college recruiting staff, after-school STEM programs), now know what material to bring to inform Latin\* immigrant families about their options. Likewise, these orga-

nizations now make an effort to send bilingual staff to these events. The tailored patchwork that Diana assembles, thus, helps organizations get closer to the information-management capacities of immigrant parents.

For parents like Rita, who are able to attend schools with regularity, having access to spaces at schools like the one Diana assembled is of utmost importance: “We need to be here with the ‘americanos’ [referring to non-immigrant, U.S. citizens], it is only by coming together and speaking up that we can start changing things around here!” School liaisons are cognizant of this need, but lack the program liaisons’ freedom to act. They, thus, are forced to resort to more creative means to assemble spaces for community-building. Some school liaisons have worked to exploit seams entailing seemingly contradictory capacities between Latin\* immigrant parents, non-immigrant English-speaking parents, and the school staff to assemble patchworks where there is no other option but to exchange information.

Gabriela, for example, leveraged a parents’ strategy to find valuable information by establishing close connections with figures of authority and the school principal’s care for his school to create a critical moment of information exchange. During a time when the country was transitioning to a government openly against non-documented immigrants, Gabriela noticed parents increasingly asking for information about how to protect their families. She then used this moment as an opportunity to bring the principal—who had not worked with Latin\* immigrant families before but care deeply about children’s well-being—closer to the everyday issues of the Latin\* community. She supported him in overcoming the language barrier and getting close to these parents:

*He was very unsure to do it because he doesn’t speak Spanish, but I told him that he was the only one they were going to listen to. He went in, and had a frank conversation with them, listened to their concerns, and answered their questions, reassuring them that the school was a safe place for them and their children.*



Inés, on the other hand, used parents' linguistic capacity, and English-speaking parents' interest in learning this language, as an opportunity for aligning these two disparate worlds. For this, however, she had to also leverage her own mastery in Spanish, English, and even technology.

*Some of the mothers of the PTA told me that they wanted to learn Spanish. I then invited them to the weekly computer classes that I teach to Latin\* [immigrant] parents and prepared material for the class with questions and answers in both languages so that they had to communicate with each other. It was an incredibly rich experience for everybody. Sadly, the PTA parents couldn't attend anymore, so I went back to my regular classes.*

The literature on technology and parents from a low-income background has highlighted that existing parent-school communication technologies are not providing equal opportunities for all parents to participate [53, 249]. Liaisons' community-building efforts suggest that technology might only be able to do this by enabling community-mediators to walk along with all actors, helping them to overcome cultural and social differences.

### **Capacity-Building**

For parents to access and make sense of learning resources, they must strengthen their capacities to navigate their host world on their own. Likewise, for institutions like schools and supporting organizations to cater to the needs of immigrant families, they must learn best practices in the matter. Liaisons work towards ensuring that their clients (parents, instructors, school staff, and out-of-school organizations) can further develop their capacity of being self-reliant navigators across different worlds.

Unlike the mediators that previous research has studied [27, 237, 238, 240], liaisons' capacity-building work is not constrained to a particular service (*e.g.*, education), but expands its scope based on what their clients need to learn in order to realize their aspirations. Alicia, an after-school liaison, explains the varied nature of liaisons' capacity-building activities: "We are trying to educate the community in different fields like nutrition, school-

ing, health, things that will benefit them, and indirectly, will benefit their children.” The capacity-building topics that I saw in our data, thus, ranged from classes about filing taxes to instructions on emailing teachers.

Creating such wide variety of capacity-building opportunities demands liaisons to be highly skilled in identifying their communities’ learning demands. Further, it requires them to assemble a patchwork of elements for devising and implementing the right solutions. Mireya, for example, had observed parents having difficulties disciplining their children. Remembering that her supervisor had introduced her to Ser Familia, an NGO for helping Latin\* immigrant families to cope with the emotional consequences of immigration, Mireya reached out to them to ask if they could offer her parents a workshop about family communication. For parents like Betty, a mother of four, this initiative turned out to be life-changing:

*My youngest was becoming hard to control, she was throwing tantrums and she got worse when I gave her a cellphone. I must admit I was too harsh when disciplining her. Thanks to the workshop that Mireya organized, I learned how to manage my temper, and to set up rules at home so that each kid becomes responsible for the family’s well-being. That has helped us a lot.*

Both parents and liaisons highlighted how they see technology as an essential topic for parents to learn. Ruben, a parent attending a technology workshop that Gabriela organized, told us “we Latin\* do not use technology the same way ’los americanos’ [referring to non-immigrant U.S. citizens] do. I mean, we use it a lot but not for so many purposes as they do. Because of that, I ended up missing out on many things that could benefit us.” Chabela also feels, as many other liaisons do, that technological skills are essential for parents to effectively support their children: “I am a firm believer that giving parents the chance to learn how to use the technologies I use at school can empower them to effectively manage their children’s academic situation.”

Assembling patchworks for fostering parents’ technological capacity, however, is not

easy. Parents' wide range of technical skills complicate the decision of what content to teach. Moreover, technology's fast development make it difficult for liaisons to find the right teaching aids. Gabriela explains: "Nowadays children know everything about technology and parents are concerned of being powerless to control children's technology use. I have been searching who can teach a class about parental controls, but I have not found anyone yet."

Through capacity-building activities liaisons also impact worlds outside of their institutions. By participating in these activities, supporting organizations, for example, learn how to deliver educational services more effectively to immigrant parents. Deborah explained this further:

*This organization gave free tablets to our parents, and this included three training sessions to teach them how to use it for school communication purposes. Even though the lady who was teaching the session was Mexican, parents had major issues in connecting with her. She was insisting on the importance of checking emails, but then again, if you cannot read [referring to parents], what sense does it make? I never got to the third session, and after that experience, the organization decided to revise its tablet program.*

The parents I talked to wanted to learn more about how to use technology to impact their children's education and family's well-being. As I saw, liaisons have the power to address this demand. However, they require the appropriate support for finding the right elements to patch so as to offer successful capacity-building services on the topic.

#### *Leveraging Technology, Content, and People as Alignment Tools*

When aligning capacities across worlds to offer multiple services, liaisons face a series of challenges that limit their ability to make an impact. Our interviews with liaisons and our observation of their everyday work suggest they heavily leverage technology, information,

and people as alignment tools for managing these challenges. I now describe how liaisons use these tools, and well as the opportunities and limitations these entail for liaisons' work.

### **Using Technologies to Assemble Patchworks**

Technology plays a significant role in supporting the various services that liaisons offer. With different degrees of mastery, I found that all liaisons engage in searching, evaluating, and tailoring technologies to ensure that, instead of being a hurdle, technologies augment different actors' capacities. Moreover, liaisons conduct different following-up activities to make sure parents are making the most out of these technological opportunities.

As Wong-Villacres et al. found, oftentimes the technology that schools and teachers suggest for parents fails to engage immigrant parents [204]. Liaisons are often the first to notice this gap and the impact that it can have in parents' ability to help their children. Moreover, their closeness to so many different actors allows them to evaluate the seams between technologies and parents, and conclude why they are not aligning. Alicia, for example, explains why *CallingPost*, the automatic phone call system her after-school program used, worked neither for parents nor for the program staff:

*Right after parents got an automatic phone call, they would call back, asking for clarification, even when the call was in Spanish. Calls were too fleeting for our parents, they could not remember all the details. We had to switch to something else, we just don't have enough staff to support so many calls!*

In such situation, many liaisons searched for other possible technology options that could align the capacities of all actors involved, including their own. This often leads liaisons to engage in a trial-and-error process that can take time, and more importantly, can be highly contextualized. For example, Gabriela tried *Remind* but found it did not fit her particular communication practices; she prefers to send long, more detailed texts to her parents. Thus for her, *WhatsApp* was a better option.

To avoid impacting parents with trial-and-error processes, some liaisons like Mayra engage in a more detailed search and assessment process. As the liaison of a parenting

program, she wants parents to use technology for learning ways to stimulate their children's development. Over our interview, she showed us three options for apps she had found on the web. She was trying them out herself before deciding which one to recommend to parents.

Despite liaisons' efforts to find the right technological patch, their freedom to choose and align parents with technologies can be deterred by institutional regulations. The school district's decision of not giving liaisons an institutional cell phone to work with, for example, highly restricts liaisons' opportunities to try new technologies. This leads many liaisons to reject apps like *WhatsApp* that require them to use their own phone number. Institutional agreements with software providers can limit liaisons' alignment attempts. In Deborah's case, this forces her to use the *Trumpia* SMS system her organization bought, even though it does not support Spanish characters and accents.

Our conversations with parents in out-of-school locations highlighted that liaisons can also be a key support when school introduces new technologies to parents. When asked about school technologies, many confirmed having received the assistance of their school's liaison for installing at least one school-related app. Ensuring that parents have access to these technologies requires liaisons to engage in intensive follow-ups with parents. Aligning with parents' culturally-grounded communication capacities, most of the liaisons in our study conduct follow-ups through one-on-one, highly personalized interactions with parents where liaisons scaffold technology use for parents. As Gabriela explains, follow-ups often stem from casual conversations:

*I usually talk to parents after parent-teacher meetings and it is then when I usually find out parents need more help with technology. Last week, for example, a mom told me the teacher had asked her to use ClassDojo, so I asked her, 'Do you have it?', and she didn't, so I took her phone, installed it, and then taught her how to use it.*

Other times follow-ups stem from liaisons' explicit tracing of parents' use of new tech-

nologies. After realizing that few parents in her program were using the platforms she recommended, Mayra asked them about it and learned that many had issues finding the text box to input their login information. She then taught each one of them how to overcome that problem.

By providing parents with operational knowledge for using school apps, liaisons' follow-up activities resemble *proximate translators*, a type of technology intermediation that Sambasivan et al. describe for ICTD contexts [237]. These intermediaries and liaisons, however, differ in their end purpose. Proximate translators' goal is to provide end-users with knowledge of basic functions without showing them how to proceed beyond that; end-users' low-literacy levels and infrastructural limitations in that context often hinder the intermediary's ability to aim for more. Interventions leveraging these intermediaries, thus, often lack support for end-users to extend their knowledge about a piece of technology [250, 251]. Given that many of the immigrant parents that liaisons serve do have basic reading skills and regular access to mobile technologies, liaisons aim for parents to eventually become self-reliant technology users. Liaisons' work suggests an opportunity for expanding ICTD's intermediary-based interventions to include support for learning beyond the basics. Likewise, interventions to support liaisons could learn from intermediate use in an ICTD context, and enable liaisons to conduct follow-ups on parents with lower literacy levels.

Teachers are relevant important curators of technology for children [33]. Our findings suggest that, for parents, it is also relevant to look at liaisons' ability for curating technology and that liaisons might need more support in navigating institutional, scalability, and parents' literacy limitations.

### **Tailoring Actionable Information**

All the services liaisons provide require parents to not only make sense but to make use of new information. As information mediators, liaisons work hard to support parents in this process, often transforming information for them [233]. The social seams between

low-income Latin\* immigrant parents' capacities and the capacities of actors in the mainstream worlds parents interact with, however, complicate liaisons' efforts. In particular, individual's capacity to protect themselves and their families feed into factors like fear of deportation, mistrust towards dominant institutions and social discomfort prevent many Latin\* immigrant parents both from relating to new information and from using it to advance their future [14, 252]. The lens of Vertesi allows us to uncover additional services that liaisons provide for managing these seams such as editing information to make it more appealing, marketing the events they organize, and following up on parents' use of information.

Conveying information to parents about how to support children's academic life is a moment of alignment for liaisons; they have to assemble a patchwork that brings two very different worlds together. To do this effectively, I observed liaisons exploiting the seams between the educational system, Latin\* immigrant parents, and their own bi-cultural knowledge to—as many of them put it—“meet parents where they are.” This often entailed speaking in a way that resonated with parents' communication strategies (*e.g.*, using culturally-relevant sayings/jokes to achieve common ground). It also meant knowing when and how to switch to an authoritative demeanor, which many liaisons found to also resonate with parents' accumulated capacities to communicate. Mariela, for example, was usually cheerful when interacting with parents. However, she became more serious and imposing when explaining to parents how important it was for them to make sure their kids kept studying over Summer. For Gabriela, Marisa, and Gisela this was a matter of being able to tell parents “las cosas como son”(similar to the English idiom “I won't sugar coat things”) so that parents could take action based on accurate information. Gisela explained further:

*Last week, I had a meeting with a father who was adamant that it was the school's problem, and not his, to deal with his child's academic issues. I had to be very direct with him, to the point that we ended up engaging in a very heated argument, but it was worth it. At the end, he realized that he also had a*

*role in helping in his child's school life, and told me 'we need more people like you who tell us things as they really are'.*

The account of Efigenia (a mother of four) suggests, however, that, on its own, an authoritative tone is not always effective in communicating with parents and that keeping a balance in how these capacities are leveraged is essential. Liaisons need to also maintain a respectful tone for ensuring parents are not offended: “for a while I literally avoided going to my child’s school cause the liaison there was too rude when addressing parents, a lot of us [Latin\* immigrant parents] would rather not approach her.”

In Latin American countries, historical classism that places value on education and origin—rather than on income alone [253]—often drives parents to hold high levels of respect toward teachers and school staff and, thus, to deem them as authority figures [254]. Liaisons’ tone-switching behavior suggests that, as bicultural individuals, they are aware of this perspective and leverage it to become more effective in transforming information from the school to parents. Further, it highlights the cultural expertise needed to successfully convey school-related information to immigrant parents.

When sending information to parents via technology, liaisons use other mechanisms to achieve a direct, and yet respectful tone that aligns with parents’ capacities for achieving an effective communication. Noticing parents’ lack of familiarity with processing excessive information, most liaisons minimize the information load. Alicia, for example, avoids sending long pdfs with new information to parents. Instead, she leverages her knowledge of editing tools to create short visual messages with summary points of what the pdf is about. Likewise, for a while, she also put great effort into tailoring the content of online resources for parents:

*I tried not to send them only links, 'cos I knew that [even] if they clicked, they wouldn't have enough time to read the information. So, I took screenshots of the most important articles and sent those to them instead. The problem was that some articles were too long to fit in a readable screenshot, so I had to edit*



*it, and it was too much work, so I stopped.*

Not all liaisons put so much effort in tailoring the messages they send to parents; not all of them have the skills nor the time to do it. However, Alicia's work exemplifies what it takes to share online resources in ways that parents find actionable.

Liaisons also engage in extending the effectiveness of the patchworks they assemble for offering community- and capacity-building services. Despite liaisons efforts, attending activities outside their home can be a burden to many low-income Latin\* immigrant parents: they have to work long hours, have many children to take care of, and usually do not have easy access to transportation [13, 14, 83, 252]. Liaisons, thus, engage in more capacity-focused assembling work to lower participation barriers. Inés tries to organize her events at hours when parents are often available and, if possible, in out-of-school locations that are closer to parents' homes. Moreover, she assembles a motivational patchwork to align her events with parents' expectations. For example, she leverages her connection to local business to get free food that she can offer over her morning workshop with parents. This not only helps parents save time, having breakfast as one less thing to worry about. It also aligns with many parents' expectation for information-sharing to happen within an environment where they can feel comfortable and close to others. Knowing that transportation can be another significant constraint for some parents and that many others do feel inclined to help given a particular community-based goal; liaisons like Gabriela and Mariela usually ask parents who have cars to carpool, frequently offering their own cars to ensure parents can attend to their events.

Aligning worlds to increase motivation for parents, however, is not an easy thing to do for all liaisons. It requires them to be very creative and well-connected to their environment. The latter is not as feasible for liaisons who work in low-resource neighborhoods where it can be hard to find organizations willing to help. Similarly, not all liaisons are familiar with diverse online resources in Spanish and have minimal opportunity to exchange knowledge about this topic with others. The lack of support from school administrators

and/or parents from other cultural and linguistic background—especially parents native to the mainstream culture—can greatly constrain liaisons’ willingness to craft motivational patchworks. Gisela shared with us how the high presence of Latin\* immigrant families in her school (76%), was not enough for convincing the PTA (Parent-Teacher Association) to include parents in the organization of their events:

*With my parents [the parents of her community], we wanted to organize a fund-raising event where other Latin\* [immigrant] parents could participate, so we thought of organizing a raffle ‘cos that’s a very common activity for us Latin\*. The other parents [referring to non-immigrant, English-speaking parents] didn’t agree; they thought there were other ways to raise way more money. The thing is that our parents usually do not participate in those “other ways” because they cannot afford to pay that much money. That was the last time I tried, it’s really hard to convince the school and other parents to allow Latin\* to have a presence.*

Many liaison told us similar accounts, that school administrators, with the goal of being inclusive, discouraged liaisons from accepting or asking for donations that benefited one group of parents only, limiting liaisons’ possibilities to craft effective motivational patchworks.

The final service that liaisons assemble to mediate information is to follow up on parents’ perspectives on the newly provided information. As Diana, the coordinator of an after-school program, explains, liaisons leverage cultural norms for this purpose: “We call them up to three times before the event. In each call we devote time making conversation with them and then we talk about the event, and remind them that their presence is super important for their kids and for us”. Liaisons also make sure to open different channels of communication (*e.g.*, phone calls, *Remind* messages, or one-on-one conversations) for parents to ask questions about new information. However, stakeholders unfamiliar with these cultural nuances do not always understand why so much effort, time, and resources

must be devoted to the endeavor of reminding and answering parents' questions. In Diana's case, the program's partners were only convinced that culturally-shaped reminders were sufficient after seeing parents' high level of attendance to the event.

### **Expanding their Capacity To Align Worlds**

Similarly to other mediators, liaisons need the support of human resources who can either work with them or facilitate content/locations/incentives for their activities [238]. Liaisons use two key mechanisms to ensure the collaboration of others: (1) motivating parents to work with them and (2) establishing a working relationship with organizations outside their institutions to secure resources for assembling patchworks.

Putting together a group of Latin\* immigrant parents who can work with them is an essential step that most school liaisons take towards ensuring human support. Engaging parents in volunteering work is, however, not an easy task. Volunteerism in the U.S. tradition is often a unfamiliar idea for immigrants coming to the country [255]. In their countries of origin, Latin Americans, in particular, do volunteer, but do so as an everyday activity that responds to the immediate needs of those closest to them (*e.g.*, family, friends, the church) as opposed to an action for a mainstream community-based organization that helps a particular group of people [256, 257]. For Latin\* immigrant parents, thus, volunteering at school can make very little sense: teachers and school staff are not part of their close circle, and, more importantly, language and educational-level differences make parents believe there is nothing they can contribute to school. Further, many parents are fearful of participating at an environment they consider so culturally distant from theirs [13].

To convince parents to volunteer, liaisons have to align the dominant culture's notion of volunteering with parents' accumulated cultural capacities around family care and community-building. Liaisons often exploit cultural and emotional seams between schools and parents for that purpose. Mariela, for example, tells her parents that volunteering allows them to have a first-hand look of how their children are doing at school. In addition, liaisons try to make volunteering a safe space for parents to be at school: they offer a wide

range of volunteering activities that parents can feel comfortable with; and assign locations for these tasks that afford parents with a sense of familiarity. Gisela explains this further:

*They come to my office, it is a small place but moms prefer to come here because they feel comfortable. I am here, they know me, and feel at ease. Also, here there are always other moms who can explain the new ones what to do, and they start to know each other more. We always joke around, and gossip while they are here helping out.*

Such bonding with liaisons motivates parents to continue visiting the school, progressively developing a relationship with teachers and other school staff that fosters information transfer. Further, it enables liaisons to start delegating more empowering activities to parents, so that they can become more self-reliant in how they navigate their host country. When her school was left with no PTA, Inés ran to her group of volunteering parents and pushed them to become the first and only Latin\*-ran PTA in the entire district:

*I told them, “you have to come and help me cause if you don’t, we won’t have a PTA”. They are usually afraid to lead, to commit to these things. Many only have a 2nd grade level education and feel they have nothing to do running things at school. But they know me and they trust me, so I told them “I’m also afraid of this and don’t know how to do it, but we can learn together”. Now they organize events themselves, they bring the ideas and decide who is going to do what. I help them, but they are the ones running the show.*

The experience of Fabiola, a mom I met during our interview with Gisela, further illustrates the impact that volunteering for liaisons can have on parents:

*My girl is no longer in this school, but I still come to help. Here, I’ve earned people’s trust, their affection, and more important than anything, their respect. Thanks to this school I learned English, and every time I needed them, Gisela and the school were there for me. This school is like my second family.*

Although such an empowering parent-liaison relationship is desirable, it is not always possible. Not all parents can or feel the motivation to volunteer. A pending question for HCI would be where and if technology could have a role in remotely empowering parents who cannot attend school.

Liaisons frequently need to connect with organizations beyond their institutional boundaries to secure resources beyond volunteers. Our data highlights two particular mechanisms they use for bridging social capital: (1) they harness institutional contacts and (2) find new contacts on their own, going great lengths for establishing a long-term working relationship with them.

Within the institutions where liaisons work, like schools, there are actors whose responsibility is to find contacts from the outside world and forward those to liaisons (*e.g.*, the school principal; school's media center specialist; and the liaisons' coordinator). Many of the liaisons I interviewed only harnessed these contacts to support their work. However, this mechanism depends too much on other people and thus, it can limit liaisons' capacity to think about new services to offer.

A handful of liaisons chose to "tomar la batuta" (take charge) instead, and build social capital for their institutions on their own. This requires them to go beyond their institutions and connect with new organizations. Often it requires a willingness to try new things as opportunities arise both within and outside of institutional limits, and even if the connection to education is not apparent immediately. Mariela's case explains this further:

*I say yes to all organizations that come to the school to offer their services. For example, a cultural organization from Guanajuato offered the visit of a Mexican plastic artist. I said "yes!" but I did not really know how to use it at school. With my volunteer parents, we decided to ask the artist to teach parents how to craft piñatas. We then offered these piñatas as prizes for kids who got really good grades over the year.*

Making these connections is essential but liaisons must also work towards maintain-

ing them. Mariela, for example, calls on her largest community partners regularly, and re-introduces herself with a card and chocolates whenever there has been a change in staff. Many liaisons, however, reported feeling that, achieving these connections was not possible in their communities, which they felt had more difficult problems to tackle. Further, some reported they had tried to do these activities but stopped due to the lack of support of their schools' administration which did not allow them to take donations from outside organizations or to seek out for opportunities exclusively for Latin\* immigrant families. Our analysis suggests that identifying ways for liaisons to find and maintain new contacts could greatly help their work. The institutional limitations they face, however, indicate there is a need to make the potential impact of their work more visible.

#### 4.3.7 Designing for Liaisons: Challenges and Opportunities

Kentaro Toyama, in proposing his law of amplification for the field of ICTD, asserts that technology projects in global development are most successful when they amplify—instead of fixing or replacing—successful development efforts [5]. Our analysis suggests that liaisons could be considered as a successful development effort introduced by the U.S. educational system. As we saw, their role is essential in supporting their clients (*e.g.*, parents, schools, supporting organizations) align their capacities towards achieving particular information goals. However, we also saw them facing key challenges preventing them from reaching their full potential. We now discuss those challenges and propose opportunities for technology to address these limitations and amplify liaisons' potential to disseminate information.

##### *Liaisons' Challenges: Knowledge, Workload, and Visibility*

Our analysis highlighted three fundamental limitations hindering liaisons' ability to assemble capacities for putting new information-based services in place. *First*, across liaisons, we saw an unequal distribution of knowledge about resources—including technology—and

ideas for offering new services to parents and other clients. This was more the case with liaisons in public schools, who often are at a considerable physical distance from their larger organization (the school district), and operate in areas where access to resources and supporting organizations can widely vary. *Second*, from our analysis, it became apparent that, despite their best efforts, liaisons' work can be too much for one person. Liaisons often serve over 300 parents, and, to be effective, they need to engage in co-located, one-by-one interactions, where closeness to parents can be achieved. *Finally*, liaisons can be highly effective when given autonomy to assemble services (*e.g.*, being able to receive donations that would only benefit Latino immigrant parents). Lack of visibility of how liaisons' work can benefit the entire school community can affect institutions' as well as other parents' willingness to provide the needed freedom to act.

### *Design Opportunities*

Besides highlighting problems, our analysis revealed promising opportunities for technology to support liaisons' work, thereby benefiting parents. Mainly, we propose that technology can support liaisons in (1) forming *knowledge communities*, (2) increasing parents' participation *at a distance*, (3) and conducting more effective *technology intermediation* work.

Technologies like online *knowledge communities* [258] could assist liaisons in organizing their experiences, so that information about rich resources is equally distributed. This has shown to be an effective solution for educators [259, 260, 261]. In liaisons' case, such a platform would need to support them in learning about others' services. For example, an online community could curate liaisons' experiences to offer them periodic suggestions on ideas for services (*e.g.*, how to organize a math workshop) that respond to each liaison's context (*e.g.*, parents' demographics, location, and level of school's support) and interests. Suggestions could include rated details on how other liaisons assembled a service (*e.g.*, content to include, locations to use, organizations that can help, ways to advertise the ser-

vice). The platform could also provide a map of people/organizations that liaisons could reach out for specific purposes (*e.g.*, teaching a class, getting donations, and so on). As an environment that records liaisons' efforts, a knowledge community could also showcase the benefits of liaisons' work, thereby helping in persuading others to support this work further.

As our analysis showed, engaging parents in volunteering work not only lessens liaisons' workload but enables parents to develop a close relationship with the school based on mutual appreciation and respect. Volunteer parents, however, are not easy to find. Designing technologies like *volunteer management apps* (*e.g.*, *SignUpGenius*) specifically for parents and liaisons, could help increasing the *participation of parents who are more distant from school*. In our data, many parent volunteers started out with a small task, gained experience and confidence and grew into larger volunteer roles, with some eventually taking on leadership roles. Leveraging this observation, the app could allow liaisons to create micro-tasks (*e.g.*, photocopying homework sheets). As parents complete these tasks, the parent-side of the app could show them a visualization of their impact in the school and the community. Further, as they become more experienced volunteers, it could start suggesting them more complex tasks (*e.g.*, organizing a meeting with parents at their location). This, in turn, could encourage more parents to become invested in the school, increase the quantity and quality of parents volunteer efforts, and reduce some of the liaison's workload.

One of the more relevant but time-consuming tasks for liaisons is *technology intermediation*; to go over how to install and use the entire suite of apps for communicating with the school (*ClassDojo*, *Parent Portal*, email, and such) could take up to an hour per parent, which is hard to scale. Plus, parents who do not attend school rarely know about this service. This signals the need to revamp the design of parent-school communication apps to offer support to parents. For example, *ClassDojo* could alert parents when they have not used it for a while, suggesting someone who could provide support (*e.g.*, the liaison or another volunteer parent). *ClassDojo* could also offer liaisons general statistics of installation



and usage so that they can take appropriate action if needed. In a similar line, the school email platform could also issue a report on parents' use of this service. Having access to such information could help liaisons become more effective in their technology intermediation efforts. Further, redesigning school apps to fit the need of immigrant parents would likely benefit a much wider parent audience as well.

#### 4.4 Conclusion

This chapter described the first phase of this dissertation. Guided by a view of parental engagement as a relational phenomenon taking place in an ecology of actors and of assets as cultural capacities, this phase attained a holistic understanding of how ICTs and the diverse capacities in the ecology of Latin\* parents might interact to support them. Three qualitative studies illuminated different perspectives of how ecology actors use their capacities to create and navigate information channels—including those technology-supported—that benefit parents. The first study (S1 - Section 4.1) explored the perspective of different U.S. American parents on how parent-education communication operates and relates to actors capacities, nationwide. From that baseline, the second study (S2 - Section 4.2) worked within the ecology of Latin\* immigrant parents to examine how ecology actors might align their capacities to support parent-education information channels. Finally, the third study (S3 - Section 4.3) unpacks the information work of mediating actors in this ecology, constantly aligning other actors' capacities to create information services for Latin\* parents.

These three qualitative studies offer two contributions to previous HCI work on the design of parent-education technologies that can support nondominant groups. *First*, it offers a rich description of how online and offline information channels rely and/or support the capacities of the many actors working in the ecology of Latin\* parents. *Second*, it identifies an initial set of four assets-based design pathways for parent-education technologies working with and for Latin\* immigrant parents:

- Smart, interconnected interaction spaces working in parents' existing information

channels with figures of authority, which allow all actors to share information and contribute to a unified repository of experiences and resources.

- Critical re-designs to existing educational and parent-education apps to provide parents with more opportunities to make sense of these apps and offer bilingual liaisons better monitoring and guiding mechanisms.
- Remote volunteering apps for parents to, incrementally, work with bilingual liaisons in activities that benefit the school community.
- Interaction spaces for liaisons to share knowledge, experiences, and resources.

*In addition*, this phase's studies make a theoretical contribution to emergent HCI explorations on assets-based design. Specifically, it demonstrates how ANT and the language of seams—both STS analytical lenses—can illuminate the analysis of assets and its relationship with information and technology in a large-scale system.

**CHAPTER 5**  
**PHASE 2: PARTICIPATORY ASSETS-BASED DESIGN OF**  
**PARENT-EDUCATION ICTS**

Based on extensive ethnographic fieldwork with Latin\* immigrant parents, the first phase of this dissertation (See Chapter 4) suggested a series assets and pathways for leveraging these assets in the design of parent-education ICTs. Although these findings entailed a rich description of parents' everyday use of assets, they are based on the author's partial understanding of Latin\* immigrants' realities. It remained critical to explore how to use this partial knowledge for supporting parents and bilingual liaisons in developing a situated perspective on their assets and assets-based design pathways for parent-education information channels. In particular, a pending question is how to support institutional actors in the educational system in imagining systemic changes that prioritize parents' assets and aspirations. In this chapter, I describe the second phase of this study, which entailed two PD engagements addressing this pending need. Study 5 explored parents' views on their assets and possible application of those assets to attain desirable transformations in the educational system [176]. Study 6 describes how, via PD, I transferred parents' insights on their challenges, assets, and aspirations to parent-education bilingual liaisons and supported them in iterating on design concepts prioritizing such assets.

**5.1 [Study 4] Designing with Parents: Identifying Assets and their Potential for Re-imagining Parent-Education ICTs**

5.1.1 Introduction

The three previous qualitative studies of this dissertation (See Chapter 4) highlighted a series of mechanisms in which parents and other supporting actors mobilize their assets to

make sure information flows towards parents. They also unpacked the complex reasons why many times different assets—or capacities—cannot work together, failing to create or maintain information channels for parents. As a whole, these studies suggested assets-based design pathways for intervening in the educational system. However, given the information fragmentation that current parent-education ICTs are currently producing and reproducing in the educational system, it becomes critical to carefully reflect on ICT interventions in that context. Specifically, it is essential to work such interventions with the populations most impacted by them [61, 179, 262]. Study 5 addressed this need by engaging in a one-month PD endeavor with two distinct groups of 15 and 25 Latin\* immigrant parents from a low-income background across the city of Atlanta, U.S.

This endeavor supported parents in identifying their capacities, analyzing how they relate to the assets and limitations in the educational system, and, from there, imagining desirable, transformational assets-based futures [176]. The end goal was to abstract design implications from parents' view of their assets in the present and the future. Specifically, this study explored the following questions:

- *RQ1* What assets—or capacities—do Latin\* parents identify having for finding, accessing, and making sense of information for protecting their families?
- *RQ2* How do Latin\* parents envision leveraging their capacities towards the betterment of parent-education information channels?
- *RQ3* What design opportunities and challenges do Latin\* parents' assets-based visions for future information channels suggest for assets-based parent-education ICTs?

The end goal of unpacking assets-based design implications from parents design work prompted a pressing question. As [6] showed, assets in one context can be a constraint in another, and thus, determining which asset can support which goal for design is not simple. In particular, understanding the asset-goal relationship requires a rich analysis of an asset's

history, uses, successes, and failures. Only from that analysis is then possible to understand what particular goals for design are feasible what asset.

This study demonstrates cultural sociologist Ann Swidler's theory of *culture-in-action* [55, 263] as a productive lens for analyzing the assets-in-action that are collected during an assets-based PD engagement. This theory proposes that culture shapes the capacities we use to act in the world. Culture, Swidler argues, is a *toolkit* of public symbols and social practices allowing individuals to develop capacities for constructing habitual ways of acting or *strategies of action*. Strategies demonstrate people's creative problem-solving skills. However, they can also encounter structural barriers and conflicts with other strategies. Strategies of action are, thus, a unit of analysis for unpacking individuals' capacities and their situated use. When seeing strategies of action, we can understand problems, further capacities, and the end goals for individuals in pursuing such strategies. An in-depth view of people's strategies, therefore, becomes essential for understanding which capacity can support a particular goal for design. Further, it can unearth limitations for consideration.

In providing a rich analysis of parents' assets-in-action and possibilities for design, this work contributes a community-based perspective of the future for parent-education ICTs. By framing this study's data analysis through a theory of culture, it also advances the emergent work on assets-based design, which pursues the design of sustainable social change. Finally, this work illuminates with more precision the methodological considerations needed to facilitate a design process where participants and designers prioritize assets over generating deficit-fixing solutions.

### 5.1.2 Culture in Action: A Lens for Unpacking The Design Potential of Assets

As explained in Chapter 3), this dissertation is particularly interested in unpacking assets-in-action as a mechanism to attaining a rich understanding of how assets operate in relation to their broader environment. To do so, it proposes a definition of assets as cultural capacities, which implies that assets are not necessarily always productive traits that lead to suc-

successful outcomes. They are, however, the cultural resources, skills, habits, styles, and the strategies of action, that people use to work towards problem-solving goals. Due to the systemic, ecological perspective they sought to gain, Phase 1's studies analyzed actors' capacities in direct relation to the information channels they helped create or maintain. Further, in these studies the end goal for design was to stabilize the ecology. The parent-situated perspective of assets that this study pursued, however, raised a twofold complication for understanding of parents' assets in relation to their goals. First, what methodological activities to propose to participants that could help the complexity of assets in action to emerge? Second, how to analyze the data on assets that parents produce in their conversations and designs so as to identify the asset-goal relation?

This study addressed the first challenge by drawing on Freire's notion of conscientization (See Chapter 3) [264]. For the second challenge, this study drew from Anne Swidler's theory of culture-in-action [55]. Next, I explain the critical reasons why this approach is suitable for an analysis of assets from data collected during a PD endeavor.

To illuminate an analysis of possible design goals from assets-based designs, I reviewed several approaches from both HCI and cultural sociology. Following [265], I sought an analytical lens for explaining why certain capacities are used for certain goals and the limitations that can hinder capacities' performance. In particular I considered Activity Theory [266, 267], Bourdieu's theory of capital [268], Situated Action [269], and Swidler's theory of culture-in-action [55, 263]. Previous work leveraging culture-in-action for exploring the role of culture in issues like learning motivations [270, 271] and technology appropriation [159] drove me to also consider this theory as a possible lens to pursue.

Activity Theory was promising: it offers a framework for explaining how cultural tools—or capacities—mediate the relationship between individuals, collectives, and goals within an activity system [266]. Further, it emphasizes human agency and recognizes the problems that an unequal distribution of tools can cause to the system. However, its rejection of social determinism leads it to underplay such problems, highlighting them rather

as opportunities that can help to transform the system [272, 273, 274]. In order to acknowledge social limitations, I reviewed Bourdieu's theoretical insight about the uneven accumulation of forms of capital—or capacities—that society deems as valuable [268]. According to Bourdieu, existing mechanisms for acquiring capital (*e.g.*, from one's family) tend to favor those who already have capital. Other groups, thus, are unlikely to attain social mobility. While critical of structural limitations, this view is too deterministic for our purpose: it disregards the capacities that some groups mobilize to resist power. Looking for a middle point, I then turned to Situated Action. This model's focus on the "everyday activity of persons acting in a setting" seemed to offer important opportunities for our purpose [269]. Its fine-grade level of inquiry, however, did not fit the longer span of this study's data.

Swidler's theory of culture-in-action provided a similar middle point but with a granularity of analysis more adequate for the study's data [55, 263]. This theory calls for understanding how individuals creatively use culture to solve problems without denying structural limitations.

Specifically, culture-in-action proposes an image of culture as a *toolkit* of resources like symbols, stories, and rituals which, in turn, cultivate skills, habits, and styles in its user (*e.g.*, knowing how to read people and being able to carry on casual conversation). Individuals draw these resources from their toolkit to solve different kinds of problems. Over time, they use their resources to assemble persistent *strategies of action* for routinely attaining their goals. Both individuals' cultural toolkit and their strategies of action constitute their capacities to solve problems (see Figure 3.1). In essence, this theory describes the way people act as highly shaped by the many capacities that they've acquired as they interact with culture at large. It proposes that each one of us has a cultural toolkit we can draw from for assembling strategies of action that help us face everyday problems without thinking too much.

The theory of culture-in-action also purports that the way culture influences action dif-

fers in *settled* vs. *unsettled* situations. During stable, *settled* situations the availability of certain skills and strategies of action highly influences how people choose their goals (*e.g.*, a person who knows how to read signs of loyalty will most likely pursue goals that place group loyalty over individual achievement). Over *unsettled* periods, on the other hand, people resort to examining their toolkit for reconsidering their strategies of action (*e.g.*, a person going through a divorce might turn to the wider culture—books and advice from other people—in search for insights on how to deal with love relationships). In both situations, however, existing strategies of action play a fundamental role; either they determine goals or they are tried out, reconstructed, or merged with other strategies to construct a new one.

Culture-in-action's notion of strategies of action offers unique opportunities to an understanding of situated capacities for design. *First*, individuals' strategies reveal the creative ways in which people use their cultural toolkit. This can provide insights into how to use the toolkit's content for design. *Second*, looking at how strategies of action relate to goals can inform design decisions of what capacity to use for supporting individual's and groups' aspirational goals. *Third*, considering the structural limitations that impact individuals' strategies of action can illuminate possible constraints for design interventions to use the right capacities for the right goals.

### 5.1.3 Methodology

#### *Recruitment Process*

This work follows a three-year ethnographic fieldwork in 16 locations across the city of Atlanta, U.S., with over 300 low-income Spanish-speaking parents, mostly from México and Central American countries (see Chapter 4). During previous work, I established strong, trusting relationships with different community partners (CPs) working in locations distributed across the city, including after-school program administrators, and bilingual parent-school liaison. As part of the fieldwork, I kept these CPs informed about existing



findings and research activities, and, upon their request, I frequently facilitated technology talks and workshops to the families they serve.

For this study, I leveraged these connections to recruit parent participants from urban and suburban regions in the city. Originally, the goal was to recruit parents from four different locations (L1-L4) across Atlanta(Group A) to work a one-month PD engagement with them during 07/19. With 15 participants, this engagement pursued a conscientization process for parents to identify their assets—or capacities—in relationship to their broader context, and envisioning how to use them in the design of new futures for information channels working in the educational system (see Chapter 3).

The decision of recruiting participants across locations responded to the recommendation of various CPs, who felt that the design of parent-education ICTs demands the representation of the widely different experiences that Latin\* parents across school districts. Recruiting in L1 and L2 allowed the inclusion of parents from elementary schools living in suburban settings with radically different socio-economic backgrounds and information-access services. The inclusion of L3 and L4, which are supporting organizations targeting low-income Latin\* families, enabled the participation of parents from diverse urban areas and school districts. Table 5.1 provides details of our field sites.

Table 5.1: Details of field sites per recruited groups

<b>Group</b>	<b>#Participants</b>	<b>Location: Area</b>	<b>Site</b>	<b>District</b>
A	5	L1: Suburbs	Public Elementary	SDA
	5	L2: Suburbs	Public Elementary	SDA
	3	L3: Urban	After-school Center	SDB
	2	L4: Urban	Catholic Church	SDB
B	25	L1: Suburbs	Public Elementary	SDA

During the recruitment process, the CP at L1 asked me to also teach a technology workshop to 25 parents. After discussing the goal and content of the workshop with the

CP, we agreed to design this workshop as an opportunity for parents to reflect on the role that ICTs can have in supporting and augment their capacities in terms of parenting and information management. The 25 parents formed a second group of participants (Group B). Five of our participant parents participated both in Group A and Group B, adding up to a total of 35 participants.

The majority of this study's participants were from México (33), with a few from El Salvador (1) and Honduras (1). All participants but one were females (34); half of them lived with their partners. All participants belonged to low-income groups; over half of them held part-time jobs (*e.g.*, cleaning houses), and a few worked full-time (5). All had lived in the U.S. from an average of 8 years, and only one reported being fluent in English. Participants' educational attainment was diverse: 14 had not finished high school, 20 were high school graduates, and one of them held two Masters' degrees.

#### *Assets-Based PD: Groups and Activities*

As described in Chapter 4, drawing cultural theories, this dissertation promotes a view of assets as the cultural capacities that individuals and communities mobilize to get by in the world [55], and a view of assets-based design as the process of leveraging existing capacities towards augmenting the capacity to aspire and to contest [54]. Informed by participatory approaches of research and design, I pursued such assets-based design process via a PD path of expression [275] that emphasized assets-based conscientization [199]. That is, a process that support participants in forming a collective that appreciates their capacities and critically reflect on how these capacities operate in relation to their broader context. For that purpose, the path of expression proposed two critical differences from common applications of PD. First, instead of leading participants to find a solution to a predefined problem [157, 276], this path led them to incrementally explore and re-discover their reality, including their capacities to get by in it. Second, instead of assuming technology introduction as the inevitable end goal [166, 179], this path fostered a collective,

critical analysis of how technology currently interacts with their assets and how it could be leveraged to support/augment them in the future I will discuss the motivation for this view of assets-based design PD, its methodological implications, and values in Chapter 6. In this section, I will detail the stages that defined the path of expression for each group of participants and the activities these entailed, explaining how working context of each group defined the nature of their paths of expression.

Table 5.2: Details of the activities Lucinda facilitated for Group A and B during June, 2019

Stage, Week	Group A
Stage 1, W1	<p><b>LPA1 - Tree of Life:</b> Using the metaphor of a tree, participants crafted and presented a visual representation of their roots, skills, hopes, and dreams .</p>
	<p><b>LPA2 - Parent Journey:</b> Using the metaphor of a road, participants crafted and presented a visual representation of how they had addressed a parenting challenge and how they felt throughout the process.</p>
	<p><b>LPA3 - Board of Assets and Challenges:</b> As parents presented their trees of life and parent journeys, participants wrote down in post-its the assets and challenges they identified in other parents' narratives. At the end, they pasted the post-its on a board for the group to see.</p>
Stage 2, W2,3	<p><b>LPA4 - Photo Journal:</b> Over two weeks, participants shared photos over WhatsApp groups or SMS to answer questions about their everyday use of assets.</p>

Table 5.2 . . . continued

Stage, Week	Group A
Stage 2, W4	<p><b>LPA5 - Booklet with Word clouds and Photos:</b> Using the data on assets and challenges that participants had generated so far, Lucinda crafted a booklet and presented it to participants to elicit further conversation on assets.</p>
	<p><b>LPA6- Information Sources Chart:</b> Parents ordered and rated visual representations of the different information sources they had identified so far for addressing parenting challenges.</p>
Stage 3, W4	<p><b>LPA7 - Speculative Design:</b> Leveraging Fictional Inquiry Lucinda presented participants with a fictional narrative based on a mash-up of “El Chavo del Ocho” and “El Chapulin Colorado”, two popular TV Mexican shows . The narrative described the parenting challenges of ”Don Ramón a beloved character from “El Chavo del Ocho” who had immigrated to the U.S. with his children and found out that one of them was failing at school. He then turns to “El Chapulin Colorado”, a clumsy but well-intentioned superhero, who offers Don Ramón a box with objects (e.g., a magnifying glass a locket, head antennas, a flute) that only expert parents can transform into magically powerful forms of parenting support.</p>

**Group A: Imagining Changes for the Educational System** The goal for recruiting Group A was to work with parent participants in a capacity-focused endeavor towards

imagining changes in how the educational system manages information for supporting Latin\* immigrant parents. Group A's path, thus, emphasized participants' incremental explorations of their capacities from different perspectives, from the individual to the collective, from the everyday to the parenting-specific. To facilitate such an in-depth reflection, participants from Group A worked in small groups (2-5 parents) in each of the four locations for this study during two three-hour sessions and a 2-week remote activity over a period of four weeks. Their path entailed three stages: a stage for recognizing and appreciating their capacities, a stage for critically exploring and contesting their reality as it fosters/limits their capacities, and a stage for imagining capacity-focused futures. To prioritize capacities over technological fixes, future envisioning activities were speculative with no particular focus on a technological outcome.

*Stage 1: Recognizing and Appreciating Capacities*

Although commonplace, capacities—or assets—often go unseen and unappreciated. In my ethnographic fieldwork, I learned that, for low-income Latin\* parents, identifying and talking about their strengths was not something parent participants felt comfortable with. Appreciating existing capacities for addressing information and parenting challenges, as individuals first and then as a collective, was thus, a critical first step for participants. For this purpose, I proposed Group A's participants to initially work on two experience-sharing activities. These activities created opportunities for participants to see their capacities from different perspectives and uses, including how they impact their everyday lives and their parenting experiences. Working individually at first and then sharing their work with others, participants could incrementally discover how they have different problems and capacities that are very often also highly interconnected.

The first activity was fairly open-ended, asking participants to reflect on their everyday lives by crafting a tree-of-life [277] where different parts of a tree could represent various aspects of their lives: the roots for representing their origins, the trunk their present, and the leaves their desires and aspirations (LPA1). Giving parents time, placeholders, and visual

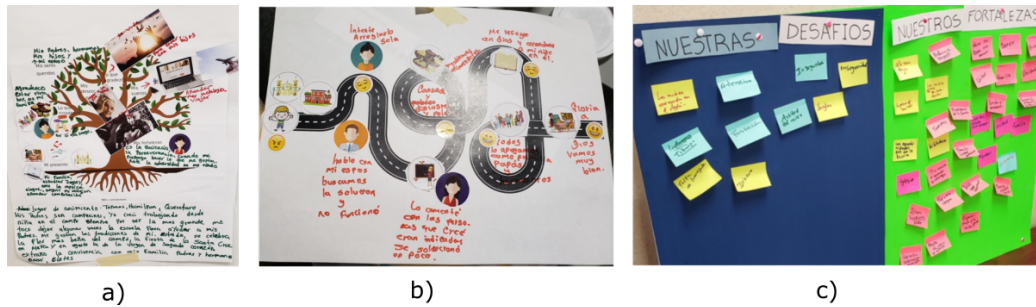


Figure 5.1: Activities of Stage 1 with Group A. a) Tree of life activity, b) Parent journey activity, c) Board of Challenges and Assets

resources for individually retrieving their memories helped them decide the aspects of their lives they found valuable and wanted to share. These included memories growing up with beloved members of their extended family, stories of how they met their significant others, struggles with diseases, and the pain of not being able to see the loved ones they left behind.

Learning how they are different but interconnected across a broad topic such as describing their lives, helped them feel comfortable to engage in the next narrative-sharing activity, which required them to switch to a parenting-specific view. Putting together a visual roadmap of a particular parenting struggles helped them explore how the capacities they had identified earlier fit in their parenting practices. Through this exercise, the participants freely and openly shared many highly personal problems, such as dealing with autism, learning disabilities, bullying, and racism, and realized the various struggles they have in common (LPA2).

During these two activities, I asked participants to take notes of the capacities and challenges they could identify from their peers' narratives. After each activity they pasted these notes on a large board for everyone to see. The note-taking sought to give participants a moment to reflect on their interconnectivity as a collective and learn from each other more deeply. Collectively crafting the public board with challenges and capacities made these interconnections more visible to all. Further, it made apparent the power and amount of their capacities (LPA3).

Figure 5.1 demonstrates examples of the artifacts parents generated during this stage.

*Stage 2: Critical Exploration of Capacities, Challenges, and Systems* The next stage engaged participants more deeply with the complexity of assets, and the role that technology has in that complexity, exploring: how are existing systems hindering or supporting participants in mobilizing their assets? How are other systemic actors mobilizing their assets to align with and support participants' assets?

This stage entailed three activities that stressed collective criticality, taking participants away from the design site to explore the larger systems that surround them. First, a 2-week photo diary activity invited participants to explore the complexity of their everyday capacities in relation to their broader surroundings (LPA4). For that purpose, I sent participants a question every other day and asked them to answer with a photo. The questions specifically sought for participants to explore opposite situations (e.g., hobbies vs dislikes, teachings vs learnings) as they experience them in the different environments they navigate, creating opportunities for them to reflect on why their capacities were different depending on their context.

The second activity took place after the two weeks. I met with the specific groups at their chosen location, and shared with them a booklet representing a collective visualization of the activities they had engaged so far (LPA5). The booklet had two word clouds, one summarizing the data on capacities and another summarizing data on challenges they had generated so far. In addition, it had all the photos they had shared during the photo diary activity. The goal of the booklet was to offer a different, more collective perspective of their understanding up to the moment, and from there, foster criticality. After browsing the booklet, we engaged in a collective conversation about the word clouds and the photos they had chosen to answer the question, their meanings, and how much this data could describe the assets and challenges of Latin\* parents beyond the limits of the design workshop.

From that collective conversation about everyday experiences, we moved to the third activity that asked parents to collaboratively start exploring the systems around, including the human and non-human actors in them, in more depth. In particular, I presented parents



Figure 5.2: Activities of Stage 2 with Group A. a) Word Clouds, b) Information Sources Board, c) Photo Journal

with the task of creating a board with the information sources they often use to support their children, order in terms of preference, and rated in terms of efficiency (LPA6). The goal was for them to work together in critically assessing the systems around them and learn about other parents' experiences with these systems. Working together on this collective representation of a large system was critical for unpacking the complexities of how systems operate, including why certain assets in the system fail to support parents sometimes.

Figure 5.2 demonstrates examples of the artifacts parents generated during this stage.

### *Stage 3: Imagining Aspirational futures*

Once participants reflected on their capacities and their broader contexts, we moved towards the imagination aspect of our assets-based path of expression (LPA7). I presented parents with a speculative design activity that, in engaging them in a magic-inspired fictional narrative, sought to de-center technology as a fixed outcome of the process and further empower parents to critique the school system and imagine a different one. Based on a mash-up of *El Chavo del Ocho* and *El Chapulin Colorado*, two popular Mexican TV shows, the narrative asked parents to consider the current situation of another parent and use magic to recommend paths moving forward. Both shows are comedies that were part of all participants' childhoods but that also represented a social critique of Mexico's historical classism, portraying characters with many similarities with the participant's parenting and economic struggles [278]. Depending on each location, participants decided to work in



groups or individually. After participants finished their magic-based design concepts, they presented them to the group and we engaged them in a short discussion about what these designs could mean for schools and beyond.

Figure 5.6 demonstrates some of the design concepts that parents proposed.

**Group B: De-Centering Technology** Group B goal was different from Group A's. As part of an on-going Summer Camp program, this group came together to attend workshop sessions about technology and parenting. In agreement with the CP, we worked together framing these sessions as assets-based PD sessions fostering a critical view both of technology and participants' capacities.

Group B, took place in a more technology-oriented and community-oriented context. It responded to a CP's observation on the community that there was a need for them to better cope with their children's more advanced technological practices. Further, it addressed the particular needs of parents from one location only. After discussing the goal and content of the workshop with the CP, we agreed to divide it in three two-hour engagements, one per week over three weeks, covering parental practices for 1) parental control, 2) online searching, and 3) social media use. We also agreed on framing these sessions as assets-based PD sessions fostering a critical view both of technology and participants' capacities. Finally, each of the 2-hour three sessions would undertake paths of expression inspired by the appreciation-contestation-imagination path of expression of Group A. However, the order and purpose of each stage varied in each session so as to support a critical learning of technologies.

Session 1 supported parents in exploring the role they think technology should have in their parental practices for controlling children's use of technology. The appreciation stage asked parents to represent their children's schedule, including the presence of technology in it, and how they felt about that presence. From there, we engaged a conversation of what they liked and disliked about that schedule, why, and how they acted to ensure things

work they were they prefer in terms of technology use at home. The imagining stage then proposed parents to collaboratively put together images for crafting an ad that could motivate their children to follow their parents' rules for technology use. After participants presented their designs, the learning stage entailed reviewing parental control apps and the contestation stage allowed for a rich discussion on how these apps could align with their capacities and aspirations for regulating their families' technology use.

To engage in a critical view of technologies for information-searching, Session 2 followed an appreciating-learning-imagining-contesting path. For appreciating both current practices, I asked parents to collaboratively search information on their phones (e.g., find a robotics class for your child, find an English class for yourself, find a new apartment). This led to a discussion about their preferred sources of information and the criteria they felt made good results. From there, we moved to learning stage where I offered a short lecture on practices for improving the efficiency of online searching. An imagining stage followed for participants to evaluate when and how online searching would make sense in relation to their existing information-seeking practices. I proposed parents a set of information-seeking tasks for supporting their children (e.g., doing homework) and list the information sources they would use in order of preference. From there we engaged in contestation stage entailing a lecture and discussion on when it can be convenient to resort to online sources and how to align online searchers with existing offline practices.

Finally, Session 3 touched on the use of social media to connect with other parents and educational actors/resources. This session started with a learning stage where I presented participants with the main differences across diverse social media platforms. It then moved to an appreciation and imagine stage where parents worked in groups to envision and create an online community on the topic of their preference. As they worked on their communities, they engaged in discussions and negotiations that shed light on their capacities and preferences. Finally, they worked on a contestation stage where they discussed and presented how they envisioned their online communities in the future, including the profile



Figure 5.3: Activities done with Group B, including (from left to right) crafting an ad about parental control, searching online, and ordering information sources in terms of priority.

of new members, more topics to include, next steps to make it sustainable, and privacy preferences.

Figure 5.3 offers images of some of the artifacts parents created during these sessions.

### *Data Analysis*

In this study, I collected data on parents’ self-identified capacities as well as on parents’ use of these capacities for designing parent-education technologies. However, drawing design insights from this data was a challenge. First, parents’ self-identified capacities often clashed, producing constraints (*e.g.*, perseverance helped many parents pursue a form of support for children, but it also blinded them from other opportunities). Using participants’ designs as a starting point did not help either: most lacked a direct relation with education. For example, many participants proposed artifacts that, instead of stressing on children’s education, sought to help “Don Ramón” improve his capacity to foster family unity. A pressing question was to understand what these designs could reveal about parents’ educational goals and their use of capacities for attaining such goals.

Culture-in-action offered a lens for exploring this issue. This theory posits strategies of action is the start point for understanding how and why action takes place, unearthing people’s use of their capacities in relationship to their goals. To identify cultural resources and goals from a knowledge of parents’ strategies of action, in this study I engaged in

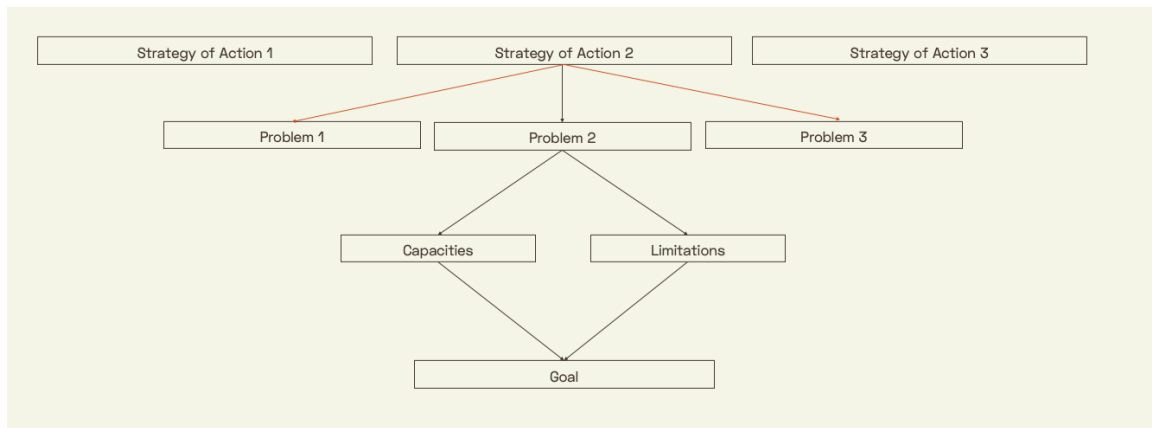


Figure 5.4: A visual description of the data analysis process, showing the process of analyzing each strategy by unpacking the problems it helps address, the capacities and limitations it requires, and from there, the goal it pursues.

a three-step data analysis process. *First*, through a deductive data analysis I identified the strategies of action that parents were using for addressing academic problems. This highlighted strategies such as ‘giving *consejos* [nurturing advice] to children,’ ‘engaging in closeness with teachers,’ and ‘pursuing aspirational learning.’

*Second*, per strategy, I sought to identify the goals each strategy pursued. To do this, I first deductively analyzed the data under each strategy to identify the problems that the strategy was trying to solve. For example, the strategy of ‘aspirational learning’ was trying to solve the social discomfort of being in a foreign country. The problem, however, does not explain why parents choose a particular strategy; the goal does. To identify the goal behind the problem, I leveraged culture-in-action’s notion that people are more likely to pursue goals for which their capacities are well-suited [55, 263]. I, thus, conducted an in-depth analysis of the capacities and limitations shaping parents’ actions to solve a problem. Specifically, I looked into our data to answer the questions: “what are participants’ well-developed capacities to solve this problem?” and “what limitations would prevent them from solving it?”. For example, the data indicated that parents’ capacities to solve the problem of social discomfort are control of their own space, appreciation of *superación* [personal growth] as a life goal, and the ability to find online resources for learning aspira-

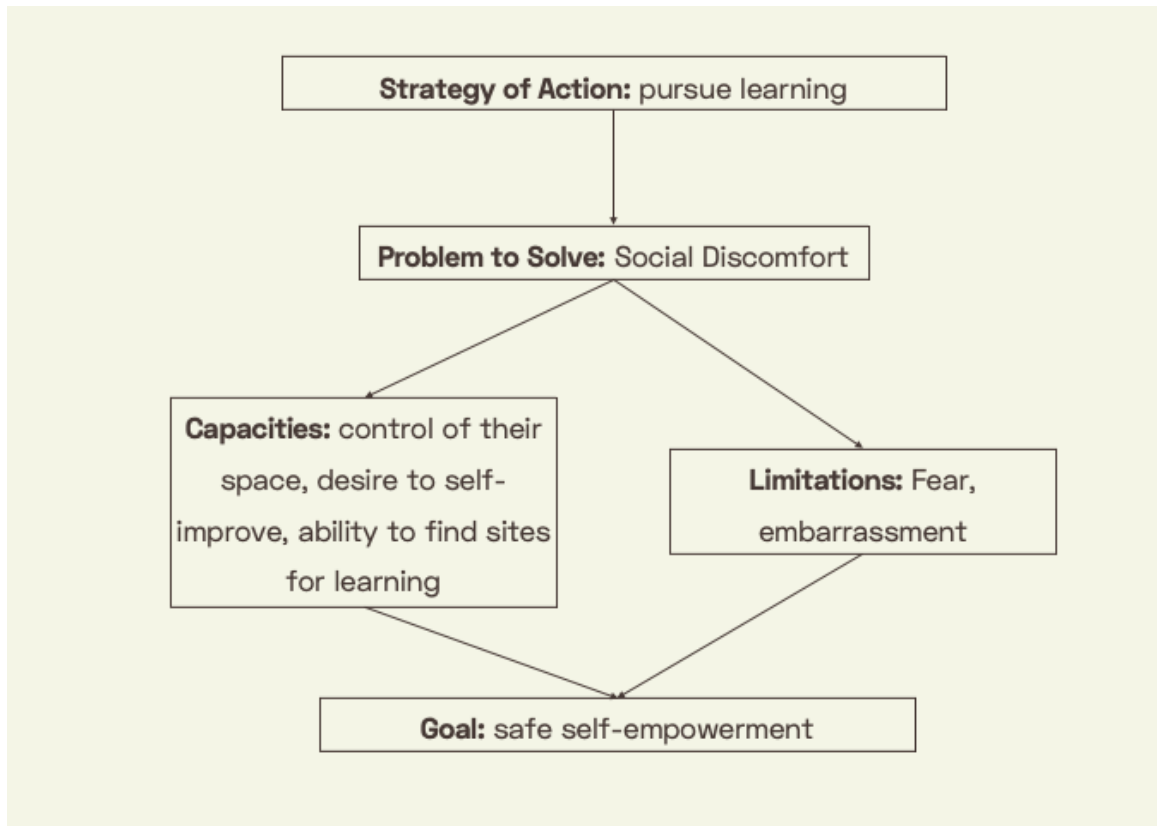


Figure 5.5: Visual representation of the data analysis process of the aspirational learning strategy that many parents used to address the social discomfort of being in a foreign country.

tional content (e.g., a Facebook group with cooking recipes). Their limitations to solve the problem, on the other hand, are embarrassment and social fear. Juxtaposing both suggests that their overall goal is safe self-empowerment; that is, one where they are in control of what they learn with little opportunities for feeling embarrassed or failing in front of others. In terms of design, this is already significantly revealing: for example, when designing to support this parents' learning process, we cannot force social components for that would probably scare them away.

*Third*, with this enriched understanding of parents' capacities and everyday goals, I then turned to dissect each parents' design for finding possibilities in them. In this case, the designs themselves represented strategies of action. To analyze them, I first classified designs based on the problems they were addressing (e.g., social discomfort, children's academic issues, finding information). From there, per design artifact, I performed a similar analysis that the one aforementioned, identifying and unpacking the capacities, goals, and limitations behind each design. Per problem, I then compared our new analysis with the ones we already had. Any differences in capacities, limitations, or goals could then shed light on new design directions. For example, a design proposing head antennas for taking away "Don Ramón"'s fear of speaking English that will also send signals to ask for help to others in case it is needed. This design addressed the problem of social discomfort. The goal was still safe self-empowerment: the antennas were for "Don Ramón" to learn without feeling embarrassed. The capacity used was still the control of one's space. However, the component of connecting with people was new and revealed the potential use of new capacities for addressing this problem. From the whole analysis, I knew these capacities were often used for other different goals and could see that parents were considering it feasible for a new purpose. With this knowledge, we could envision new ideas for technology to support parents' desire for safe self-empowerment. See Figure 5.4 for a visual description of this process and Figure 5.5 for a visual description of the example here presented.

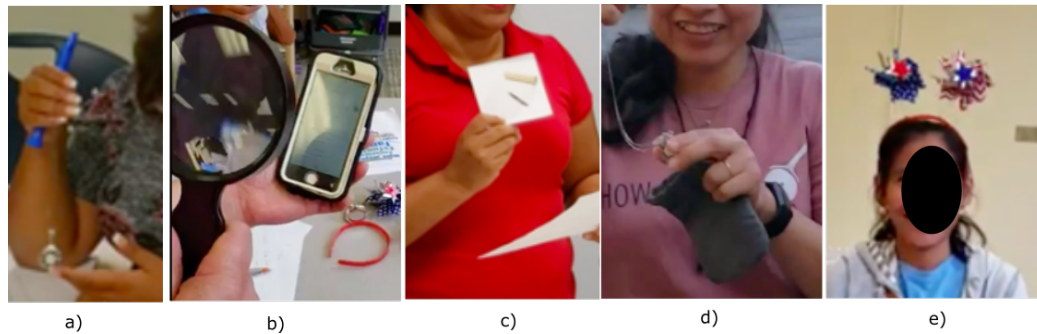


Figure 5.6: Some of the designs parents created (from left to right): a) Magic Flute, b) Magnifying Contacts, c) Advising Pen and Paper, d) Friendship Antennas

#### 5.1.4 Findings

I now present the analysis of the four strategies of action we identified in our study, unpacking how parents’ capacities can be mobilized for design. For each strategy, we identify the problem it attempts to solve. Further, we offer an in-depth analysis of the goals behind the problems that each strategy attempts to address. This analysis also reveals the capacities that we saw parents mastering and the limitations they face. Some of these capacities might seem to misalign with dominant notions of optimal parenting and learning. Drawing on situative theories of cognition and learning [279], I explore how these situated, non-dominant everyday practices, together with parents’ attempts to use them in the design of parent-education ICTs, illuminate design insights for changing the future of this ICTs as they operate in the educational system.

##### *Strategy 1: Information Exchange via Closeness & Authority*

The data collected for this study highlighted that, when a serious academic problem arises, parents face what a culture-in-action theory calls *unsettled* times [55]: feeling insecure about how the educational system works, they try out different strategies to address the problem. One of the strategies participants frequently resorted to is attempting to *engage in a close relationship with teachers*. I first discuss the problem that this strategy is trying to solve and the challenges it faces to be effective. Despite the strategy’s issues, I analyzed it

to understand the goals and capacities behind it. I found that parents engage in closeness for securing an authoritative source of information that can help them with children's academic struggles. Based on parents' designs, I identify parents' goal of accessing more actionable information for supporting children. I then discuss how technology could mobilize the unearthed capacities to help parents attain their goal.

**The Limits of A Strategy for Addressing Academic Struggles** Collected data showed that all participants, at a certain point, had tried to get closer to teachers as a strategy to solve children's academic struggles. Indeed, across locations, parents identified teachers as their preferred information source for handling issues at school. However, in their *information sources chart* (as described in Methodology), parents assigned a low score (2.5/5) to teachers' ability for delivering effective information. This dissonance was grounded in parents' disappointment towards teachers' lack of willingness to engage in closeness with them. Esther's comment reveals the structural barriers limiting a closeness-based strategy: "teachers do not have the time to meet with 20 parents wanting to talk to them per day." As she explains, this strategy's failure entails further implications for parents' relationship with school: "some parents send notes and when the teacher does not reply, they think, 'oh, they [the teachers] don't care', and then parents stop trying."

This strategy, I learned, can be ineffective even for parents who do succeed in their attempts for securing closeness. It can narrow down too much the possible information sources parents are willing to use. After finding out about the learning challenges that her son Miguel was facing, Melina devoted all her efforts to develop a close relationship with Miguel's teacher. At the end of the year, the teacher provided Melina with a folder of activities for Miguel to master over the Summer. During our meetings, Melina repeatedly mentioned how frustrated she was with Miguel's progress on those activities. However, she discarded other parents' suggestions to use different learning resources. "I first have to do what the teacher told me to do," she replied to them.



**The Goals and Capacities Behind Closeness** Due to the many limitations of this strategy, it might be difficult to leverage it for design. However, recognizing it is still a capacity that parents are attempting to mobilize as well as one that is affecting their relationship with their main source of information, I decided to analyze it in depth. Our goal was to unearth other capacities this strategy might entail that could be productive for design. Lucia's experience illustrates our analysis. Like Lucia, many immigrant parents have developed distrust-based strategies for protecting their family and themselves. "I don't like to confide my problems to anybody else than my husband, my children, and God," she told us. This, however, tends to keep her isolated from diverse information that could help her family. When her nine y/o son started to show discipline and academic problems, she faced an *unsettled* time: "Looking back, those were hard days. I had no idea what to do, and prayed to God for an answer."

In line with a culture-in-action's description of people's conscious, exploratory behavior during unsettled times, Lucia looked into her cultural toolkit and found a strategy she felt could work: attempting to *negotiate information on a one-on-one interaction*, in this case, with the teacher. This is a strategy that I saw most participants leveraging for most of their information-seeking problems, from finding a new apartment, to finding solutions for medical problems. As participants explained, engaging in conversations with others—strangers or acquaintances who also speak Spanish—can be a powerful strategy to access information that responds adequately to one's needs. Lucia did not talk about her personal life with others; however, she used the strategy of negotiating information on one-on-one interactions for solving other information-seeking problems such as learning about new events at her church.

Using that strategy in the school context, however, was not an easy endeavor. Lucia mentioned several times that she felt extremely uncomfortable when having to gather information from English-speakers. She, however, decided it was still worth trying; being isolated from other information sources, she needed to secure a connection with *a trusting*

*figure of authority* to tell her what to do. That was, thus, her end goal. Lucia resorted to her understanding of perseverance and *superación* [self-improvement] to get the strength needed for doing what she felt she had to do. In her particular, case, it worked.

*When my son started to do badly at school, I began going over there more often to talk to the teacher. I speak little English, she speaks no Spanish, but every time I went, I did my best to explain her my concerns. She ended up helping us a lot: she advised him and made him feel like he is valuable. Now we have a close relationship; she sends me notes letting me know how my kid is doing.*

**Designing with Trust and Negotiation of Information in Mind** Our analysis suggests that *negotiating information* and *trust in figures of authority* are capacities that could be used in design. The question remains, however: for what and how? Technology already provides communication channels for teachers to send authoritative information to parents (e.g., email, SMS, Remind, and WhatsApp messages) [6, 204]. An analysis of parents' designs reveals that parents would like these channels to provide richer information for helping children. Esther's and Regina's "Relicario y Reloj de Tareas" [The Homework Locket and Watch] illuminates parents' design aspirations:

*'Don Ramon' has to wear the locket. The teacher inputs a homework schedule for 'El Chavo' in the watch. When it is time for 'El Chavo' to start working, an alarm goes off both in the watch and in the locket. 'Don Ramon' can then call home to make sure 'El Chavo' is doing his work*

This design confirms previous finding: parents seek a *figure of authority*, in this case the teacher, so that they can trust the information they provide. By making the teacher responsible for sending a study schedule that "Don Ramon" can reinforce, this design also suggests parents' proposed goal for design is to receive more *actionable* information. Acknowledging that such responsibility might overload teachers, new designs that pursue this

goal could rely on intelligent agents embedded in existing parent-teacher communication channels. These agents could offer teachers timely suggestions of information they could forward to parents. These agents could also offer parents the opportunity to *negotiate information* that meets parents' particular needs. For example, if the agent suggests a speech therapy resource, the parent can engage in a conversation with the agent about how to get to that location and the availability of translators in the place. Such kind of solution, that diversifies the information in parent-teacher communication channels, can be of help for parents like Melina, who has a critical demand for more trustworthy information.

### *Strategy 2: Learning about School via Consejos*

Research on Latin\* immigrant parents has highlighted *consejos*—nurturing advice—as a critical form of child-rearing support for this population [151, 280]. The practice of *giving consejos* also emerged from this study's data as a strategy of action that most parents leverage for a variety of motivational purposes. Further, across locations, parents identified it as one of their most essential capacities. A culture-in-action analysis highlights the different problems that giving *consejos* tries to solve. Further, the analysis shows how this strategy can both support and limit parents in motivating children to attain academic goals. Based on parents' aspiration for learning more about how school works, I discuss two design pathways for mobilizing the capacity of giving *consejos*.

**A Strategy for Solving Behavioral and Academic Problems** As we saw, parents resorted to *consejos* for addressing children's behavioral and academic problems. In both cases, we saw that parents give *consejos* in the form of short narratives that mix their life experiences and family's origins with an important load of values-based images like family, respect, sacrifice, and *superación* [personal growth]. Drawing on those elements, *consejos* seek to elicit emotions like guilt, pride, and fear that, in turn, can motivate a child to change their thinking and/or actions. Clara provides an example of giving *consejos* for ad-

dressing a behavioral problem. When Clara's daughters were sad after a bullying episode, Clara leveraged her family's origins—in this case, drawing a notion of classism from her toolkit—to elicit a sense of pride in the girls:

*Some kids at their school had called me fat, and my girls were really upset. I tried to make them see where they come from and where those other kids come from [implying a worse economic situation]. I tried for them [her daughters] to see how they are valuable and how those kids calling me fat should not affect them at all.*

Parent participants also gave *consejos* for addressing academic problems. Regina, for example, gave *consejos* that would elicit guilt for motivating her son to go to college:

*My husband has already told him [Regina's son] that he won't help him financially [to go to college], so he has to get a scholarship. I keep telling him that he needs to have a clearly defined goal, that if he doesn't have a goal, he will achieve nothing in life.*

As most participants, Regina only used values-based resources (in her case *superación*) to craft *consejos* for motivating academic development. Roberto's unique case amongst participants demonstrates how academic resources can be mixed with values-based ones to offer children more concrete *consejos* for addressing academic challenges.

*When my daughter told me she felt she was bad at Math, I told her .. 'it's not about being, it's about believing.' Then I told her how I was the last of my Math class until the best students in the classroom refused to help me calling me a 'burro' [a dumb person]. I then swore I would prove them wrong. By the end of highschool, I was the best in my class. It is all about effort, I told her.*

**“Consejos” in Education: Goals, Limitations, and Aspirations** The next step of my analysis was to unpack parents’ tendency to only use values-based resources for crafting *consejos* that address academic problems. This would help to highlight the possibilities of *consejos* as a capacity for design.

Most participants shared stories of having either limited or negative experiences with education. Regina, for example, shared: “I grew up working in the fields, and oftentimes I had to miss school. Besides, my parents never helped me with school stuff, so I ended up losing interest in learning.” On the other hand, the large majority mastered a values-based discourse. In Regina’s case, she emphasized perseverance: “my strength is to be perseverant. When I set my mind to achieve something, I don’t give up.” In line with a culture-in-action explanation of strategies shaping goals [55, 263], when parents like Regina face an academic problem (*e.g.*, helping her son to go to college), we saw them choosing the end goal that the resources in their toolkit facilitate. For Regina, this goal is to *keep motivating her sons’ values-based development* while hoping for her strategy to also drive an academic change.

All parents agreed, however, that for them to be more effective in how they motivate children’s academic success, they needed to increase their knowledge of the U.S. educational system. Melina explained how this endeavor was challenging but valuable:

*I didn’t like going to my kids’ school, but when my son started having problems, I began to go more often, and I learned a lot just by going. That’s when I realized that if you don’t know how things work, it’s really hard to make an impact on children’s education.*

**Designing with “Consejos”** Parents are already leveraging *consejos*—an everyday strategy that mixes notions of family sacrifice, guilt, fear, and optimism—to teach life-long lessons to their children. A pending design question then is: could we leverage this already effective, situated strategy to help parents learn how to harness the school system towards

their children’s benefit? A culture-in-action analysis of parents’ designs sheds light on possible ways to answer this. Clara’s “Mapa Optimista” [Optimistic Map] suggests that parents would see value in the possibility of giving more interactive forms of *consejos*.

*By using the magnifying glass over the map, 'Don Ramón' can show 'El Chavito' [diminutive for 'El Chavo'] places both in Mexico and Atlanta, and talk to him about their moving to this city. 'Don Ramón' can show 'El Chavito' that, yes, everything might be different here, but there are also many opportunities to grow together as a family, as well as many fun things to do in this city and new friends to make.*

This design confirms most parents’ choice of solving an academic problem by pursuing a value-based goal—in this case, motivating El Chavo to reflect on mutual obligations among family members. However, “Mapa Optimista” also indicates that parents consider technology a feasible medium for crafting more vivid and interactive *consejos*. An interactive app, for example, could assist a mother who wants to give a *consejo* to a five y/o about being respectful and not hitting other classmates. The app can provide visual and audio resources that the mother can put together for crafting a visual narrative that, by eliciting guilt, sacrifice, or fear, can convince the child of not hitting others (*e.g.*, illustrating how children feel when others hurt them). Considering parents’ goal of learning more about the school system, the same app could offer resources that embed academic content like the school’s regulations on discipline issues. In this way, parents can teach their children via *consejos* while also learning about school-related topics.

An analysis of Beatriz’s “Pluma Aspiracional” [Aspirational Pen] (See Figure 5.6.c) further illuminates this perspective on how technology could leverage parents’ capacity for giving *consejos*:

*With this pen, Don Ramón will realize that he needs to focus less on his job and more on his children. In the notepad, Don Ramón can write down information*

*about his work/life balance, and it would magically show him the pros and cons of his decisions. For example, if he writes down that he works the entire day, the notepad can show him “your son will not be able to go to college.”*

Beatriz’s design is actually an artifact that gives *consejos*. It uses values-based resources like family and *superación* to provide education-related information in a way that would elicit “Don Ramón”’s guilt, thereby hoping to change his behavior. This design confirms that parents are interested in learning about the school system. Further, it suggests that parents see technology-mediated, values-based *consejos* as a potential teaching resource for that purpose. Technology for teaching parents through *consejos* could take many shapes. For example, it could help teachers and other parents create videos with short values-based *consejos* about how school works (*e.g.*, what are possible consequences of not attending parent-teacher conferences). Conversational technologies could also intervene to answer parents’ questions about the school system through values-based *consejos*. For example, to the question, ‘what is the benefit of volunteering at school?’, the app could answer with narratives of other parents’ positive experiences when volunteering, especially stressing values-based images like family, *superación*, and sacrifice.

### *Strategy 3: Self-Empowerment via Learning and Serving*

Feeling isolated and finding effective mechanisms to move beyond that state is one of the main things parents mentioned as a struggle for them. During the PD engagement, several of them showed they resort to two key strategies for addressing this problem: self-guided learning and serving others. Next, I describe the strategies, unpack the goals, capacities, and limitations behind them, and then analyze parents’ designs to envision ways to leverage the identified capacities.

**Self-guided Learning and Helping Others as Coping Strategies** One strategy that most parents during the PD engagement shared as desirable to help them feel more connected

to others is to engage in aspirational self-learning. Contrary to academic learning, this aspirational learning addresses parents' immediate, pragmatic needs for attaining social confidence in their host country. It entails, thus, activities like taking English classes, perfecting cooking skills, following Facebook pages of successful immigrants or motivational coaches, or Youtube videos about how to improve work practices, and being part of social media groups for learning how to save money or manage coupons. Despite the unsettling feelings that our participants expressed towards technology in their children's lives, they pursued these learning activities mostly through digital media, including TV and radio, but especially via Facebook and Youtube. Parents found out about these learning sources by searching them themselves and by following friends' recommendations as well as automatic suggestions from some apps.

Another strategy many participants showed as critical for tackling feelings of isolation was to find ways to help/serve others. Across locations, mothers, especially, directly identified serving others as their most important strength and referred to examples of how they devote efforts to ensure their families' well-being, including always looking out for their needs being covered. Some mothers also referred to serving/helping outside of their home's context, such as attending and supporting church events or helping bilingual liaisons at school, which had led them to form strong ties with other community members. In the case of Laila, she had connected with another Hispanic mom at church meetings and from there, she had become closer to another group of moms who worked with the school bilingual's liaison. Together, they formed a close group who supported each other at different school events.

Parents' accounts revealing a strong use of their capacities to learn and serve hints at a need to further unpack why schools' and organizations' efforts to connect with parents by offering opportunities to learn and serve do not work as well as they should. One of the most frequent mechanisms that schools and organizations use to support the community is to organize events that offer parents important services for augment their skills (e.g., classes to



learn how to fill in taxes forms, classes for learning how to teach math to children, classes on how to support children against bullying, and so on). Another key strategy to attract parents is to offer volunteering opportunities (e.g., helping teachers to photocopy homework and resources for children). However, both mechanisms struggle to attain critical mass; parents just do not attend these events. The next step in the analysis, thus, was to explore why opportunities to learn and to serve, which seem to be aligned with parents' capacities, often fail to attract parents.

### **If We Offer to Teach them and Ask them to Volunteer for Us, Will They Come?**

While the problem that most parents seemed to be trying to address with the strategies of aspirational, self-learning and serving was to cope with isolation, it is critical to identify the specific problem-solving goal associated with these two strategies. Understanding the goal can shed light on why certain parents accept or reject institutional venues for learning and serving. A culture-in-action analysis can help unpack the capacities behind these strategies, which in turn, can reveal the goals that parents pursue. The testimonies of parents like Rita and Lucinda suggest a key capacity for driving aspirational learning is that of "superacion." Betty shared with the group: "I constantly tell my children that they need to do better than we are doing. We came here for them and we are constantly making the effort that they attain a better future." Betty's account suggests that the discourse of "superacion," which many parents mentioned as a way to deal with struggles, also seems to be critical motivator for parents to find effective ways for adapting to their environment.

Elena's experience reveals how serving is not only a strategy of action on its own, but a critical capacity tightly coupled with the strategy of aspirational learning. For Elena, her deeply ingrained capacity to serve led her to face the struggles of their two autistic children via aspirational learning means. She decided to learn English at all costs, using all the possible venues that she could, so as to get the supporting services their children needed: "I came here speaking no English at all, but I knew I needed to learn, I have attended

classes but most of all, I follow YouTube channels that offer short lessons and then I try them out when I need to talk to people here.” Being willing to experiment with social media, connecting to learning resources they can consume at their own pace is another capacity parents leverage to pursue their aspirational learning strategy.

Serving others, as Tamara explained, is a capacity deeply grounded in most parents’ cultural-historical experiences: “Ever since I can remember, I seek to serve. I go to a party and I never sit down because I immediately seek to help serve the dishes, make sure everybody has what they need.” Her testimony suggests that many parents translate serving their close ones as a way to signal their abilities—and thus, value—to others. Carmen shared how she had noticed this to be true in many of the other mothers she had interacted with: “Many parents do not like to come to school meetings, but every time there is a festivity at school, they are the firsts to come and offer ideas for dishes, sharing recipes, and offering to take others to the best places to buy ingredients for cooking.”

The capacities enabling aspirational learning and serving as strategies, however, are constrained by an important fear to fail. Many participants shared how a constant feeling of “vergüenza” [embarrassment] is one of the biggest challenges they face when trying to move around in their host country. Lupita said “One of the things I dislike the most is having to speak to others to ask for information, even if it is people who speak Spanish, I feel they are judging me.” Fear, thus, affects the channels parents are willing to use for learning and serving. Reyna for example said “I sometimes ask my children to help me learn English, to speak English to me and to correct me if I say something wrong, but I don’t like it because they end up making fun of me, and I don’t like that.”

In addition, many parents indicated that they also tend to avoid social interactions with other parents due to high levels of distrust. Specifically, many parents felt it is extremely hard to find other parents who share their similar sense of “superación” and values towards discipline and education. As such, forming connections with them, either for learning or serving, becomes hard.

Fear to be embarrassed and distrust of their environment are two critical factors that can explain why parents tend to choose venues for learning that do not require them to socially interact (e.g., learning from posts on Facebook groups). It can also explain why many parents only choose to serve at school in events where they can show their expertise, and thus, have little chance to fail (e.g., bringing dishes to the Hispanic Heritage Month). From this, we can conclude that parents' goal in using serving and learning as strategies for coping with isolation is to grow a sense of empowerment via non-threatening channels. Any initiative that poses threaten to their self-image—like going to school meetings with English-speakers and/or Spanish-speaking non-welcoming staff—will deter from their goal.

**Designing for Empowerment** What are thus, the particularities that design initiatives should take into account to support parents' goal of non-threatening self-empowerment while leveraging their capacities for learning and serving? Parents' designs revealed three critical implications. Lucinda's design of a Magic Bag (see 5.6.d), where parents and teachers can put all their concerns and then take out a magical compass letting them know the direction, is telling in terms of possible technology-supported venues for serving. She described her design explaining: "Every time a group of parents and teachers add their problems to the bag, the bag learns from it and that learning can then help other parents who need guidance." Aggregated knowledge, thus, could be a feasible way for parents to serve without risking embarrassment. For example, a platform like a WhatsApp of a Facebook group, where parents discuss their problems, concerns, and solutions, could learn from parents' conversations and offer short digests of possible solutions to those who are asking new questions about specific parenting problems.

Maria's design of magic antennas for allowing parents to signal others that they need help learning something new (see Figure 5.6.e), and Veronica's design of a magnifying glass that enriches teachers' emails with information about parents who share similar strug-

gles, shed light on a critical, additional consideration. Specifically, both designs speak about a goal for parents to connect with peers they can learn from and help when needed through mechanisms that ensure these connections are safe and with people who share similar concerns/experiences. Parents' designs using the strategies of serving and learning, as a whole, also suggest that parents might welcome opportunities to gradually go from serving through aggregated, anonymous forms to offering more direct types of support to others, building community through incremental, trusting exchanges of information.

#### *Strategy 4: Parental Engagement as Resource Orchestration*

For participants one key struggle for supporting their children's education is finding the best forms of support that align with the goals of the educational system. "Things here are just too different here" is a phrase many parents shared during PD sessions. A strategy that emerged as the most common one for parents to deal with this problem is that of orchestrating—planning and coordinating—the resources that children need to study and advance academically.

**Orchrestating: A Preference for Parents to Mediate School-Children Relation at a Distance** For most participants, across locations, understanding the best ways to support their children's academic life was an overwhelming challenge. Learning to make sense of school communications, filter them out, reach out to teachers, issue concerns and fighting for the school to respond to their concerns, all require a level of familiarity with information, technology, and the educational system that immigrant parents have yet to develop. When explaining how confusing it can be, Ruben said to Eliza, who grew up in the U.S. "The way people use technology in this country is not similar to the way we [low-income Latin\* immigrant parents] use it. They use it all the time to solve any problem. Since you [Eliza] grew up here, you have that as an advantage. You understand how to filter out information for helping our children." Eliza's reply illuminated how the problem of managing

educational resources is far more complex: “Not really, I know the language, that is true, but their practices [the school’s] and how to move around to get what our children need, is still a challenge for me.”

To respond to these demands, across activities, parents described orchestrating resources as they main go-to strategy. While the strategy changes depending on children’s age, parents’ accounts indicate it consists of finding and securing the resources that children need to study on their own (e.g., a computer, a place to study in the home, books, videos, other people who can teach them, after-school programs, and so on) and ensuring children stay focused on using the right resources at the right time (e.g., not using the computer to watch videos but to study). While some parents did share sitting down with their children to teach them new content—especially at an elementary-school level—that was not the norm amongst participants. Even when teaching takes place, it happens with the spirit of monitoring. Martina, for example, shared that her main strength was “to help my children with their homework” but during our activities she explained that this often meant monitoring they go through the material and if they struggle, finding the way to support them further, like getting a spot in an after-school program, and picking them up everyday from that program even when she does not have a car or somebody who takes care of her other children.

Despite the active involvement of parents through orchestration, school actors keep struggling to have parents engage in ways that result in the academic achievements teachers are seeking (e.g., good test results). An analysis of the real goals behind parents’ choice to orchestrate could reveal initiatives that align parents’ capacities and schools’ intentions to support children.

**Too Many Demands, Too Hard to Sustain** In unpacking the ways parents enact the strategy of orchestration we can see they often leverage not only their capacity to persevere, but of using technology as a support for academic tasks. For many participants, searching

educational support online is a particularly feasible capacity to mobilize when children are at an elementary-level content. Nancy, for example, searches Youtube videos for her child to practice counting, and basic reading. Ruben searched videos and websites for helping his daughters learn Math and ended up paying for a subscription to those services. However, even when daring to go online, parents' online searching capacity does not always align with educational demands. Mayra, for example, could not find an online resource that would aid her son with the specific trigonometry content that he needed. Ruben, Reyna, and Margarita had similar experiences. Eliza suggest that an additional limitation is to make an informed decision of when and how to introduce technology as a resource: "I never take teachers' advice on technological resources word by word. I feel learning with technology can make children too dependent on one type of resource only, and so if I can avoid certain apps, I do." In all cases, parents had tried to fill in the gaps by mobilizing their capacity to connect with trustworthy sources. For Mayra this meant relying all along in her connections with the church, from which she learned about sports options for her son, after-school programs, and eventually had access to a scholarship for a private middle school. When one of his daughters continued struggling with Math, Ruben relied on the school liaison who he considered like family, to ask for help in accessing special services from the school district.

This insistence on dealing with academic problems by securing resources, however, seems to be a mechanism to cope with the lack of control on other aspects of their lives during the uncertain times of immigration. While knowing how to navigate the system is confusing, ensuring the resources needed for children to study is the most feasible and familiar thing that parents can do. Lupita's comment suggests the cultural-historical reasons for this view of parenting as a resource-provider: "My husband is in charge of working and providing the financial resources for us to survive and I am the one in charge of providing the resources for our children's education." Although Lupita could translate this view of parenting into many possible strategies, that fact that she has a scarce relation with edu-

cation in general suggests that she relies on orchestration as a way to secure some of the additional control she has lost as an immigrant parent. In this case, then, parents' main goal seems to be to recover control over their actions so that they can feel they are actively working towards supporting their children.

The actions parents tend to take to recuperate such control, however, seem to happen with a certain level of distance from the school and teachers. Parents' fear to fail—explained in the previous section—could explain this decision: while some overcome their fear to seek closeness with teachers, most decide to retain control by staying relatively distant from individuals and institutions that might make them feel out of place and useless. As a result, the school and teachers end up having little knowledge of parents' engagement actions, which reinforces institutional actors' general idea of parents as careless and useless for supporting their children.

**Designing for Accompanying Rather Than Teaching Children** Study 2 (see Section 4.2) showed that ICTs operate in two specific ways around parents: targeting children—and thus expecting parents' to motivate technology use at home, and supporting parent-teacher communication. In both cases, ICTs lack a meaningful support to parents' orchestration strategies; that is, they do not offer support for planning, finding, and coordinating resources that support children. Further, existing ICTs perpetuate the invisibility of parents' orchestration strategies. A pending question thus is, what are desirable characteristics for parent-education ICTs that support parents' orchestration strategies?

A culture-in-action analysis of parents' designs can help illuminate paths for action. Many designs confirmed that parents long for technologies that can tell them when to act. However, designs were very particular in terms of the meaning of “when.” “Reminding lights,” for example, is a concept that Nadia proposed to let parents know when children are stuck with a particular school task or homework. By proposing a lantern that turns on automatically to issue an alert, this concept stresses that the alert needs to take place when

there is a situation that demands it. “Pendant Alert,” Eliza’s concept, further expanded on the idea of reducing rather than augmenting the number of notifications that parents receive. The design proposes that when teachers send messages to parents, they receive it in a magic pendant that vibrates, glows, or rings depending on how important the message is. Supporting parents’ goal to recuperate control, thus, implies incorporating intelligent alerts that parents can immediately make sense of.

Further, “Smart Antennas,” and “Information Map,” Ruben’s and Luz’s design, respectively, suggest parents would appreciate receiving specific instructions from technology about how to deploy their orchestration strategies. The first design allows parents to learn step-by-step information about what resources to provide their children when learning new topics. The second, is a magnifying glass that, when put over a map, can show nearby resources for addressing children’s particular needs, also displaying particular information such as who to look for in a particular site, what languages they speak, and best ways to get there without private transportation. As a whole, these designs suggest that another critical aspect of supporting orchestration is immediate guidance about possible paths to follow, both in terms of resources and resource management.

#### 5.1.5 Discussion: Problem Re-Framing, Iterations on Design Pathways, and Future Work

Phase 1 of this dissertation suggests that, following institutional visions, parent-education ICTs tend to frame parents’ problems to support their children as a problem of information: there is an undeniable information gap between teachers and parents, and ICTs act to help bridge it (See Chapter 4). While these ICTs are effective for some parents, Phase 1 demonstrated these ICTs can widen the gap when parents’ realities do not lie within the expected norm. Existing ICTs demand parents to learn practices that might be foreign to them and many parents end up rejecting that imposition. Further, when switching to ICT-supported services for parents, educational institutions tend to stop supporting other



potentially effective information channels (e.g., paper-based communication).

In working with parents in an assets-based PD engagement for envisioning parent-education ICTs, this study offered them a third space to challenge that understanding of their realities as well as the nature of parent-education ICTs. In this space, parents could discover themselves as expert problem-solvers and information-seekers, moving far away from the institutional rhetoric that stressed their information poverty. In particular, by engaging in assets-based PD methods, parents described in detail how they mobilize critical capacities for accessing and making sense of information in the educational system, including abilities to negotiate information, self-empower through learning and serving, make sense of the world via consejos, and orchestrate resources for ensuring their children have what they need for studying.

All these capacities, however, depend on the existence of a thriving community of parents, teachers, friends, and others, who are willing to interact with them. Parents' experiences and designs, illuminate that such communities are not the norm; issues of distrust towards their environment, and cultural, linguistic, and educational gaps curtail possibilities for parents to come together with other actors and mobilize their capacities. There is, thus, a need to reframe the problem of Latin\* parents' engagement with their children's education: it is not that parents need support for accessing information, it is that the educational system—including ICTs, is not supporting community-building spaces where parents can make use of their problem-solving and information-seeking skills.

A shift from information to community, however, is not seamless. As parents' designs suggest, it implies promoting parent-to-parent, parent-to-liaisons, and parent-to-organizations connections. While working with parents on highly-speculative designs helped them tackle the complexity of community-building processes, it becomes critical to derive more clear technological services from these designs. In the next section, I discuss how parents' capacities and designs advance the existing design pathways that Phase 1 produced. I also discuss future steps to move parents' ideas forward into the educational system.

### *Assets-Based Design Questions and Pathways*

All of the four capacities that emerged from this study speak directly to the design pathways identified in Phase 1. The unpacking of each capacity shed light on further specifications to these ideas and sometimes clarification on their main goals. I now discuss how parents' capacities fit into and advances pathways, sparking more specific design questions that can inform next design iterations with parents or other actors.

**Before: Meaning-making Assistant for Educational Resources** This design pathway proposed to revamp existing educational and parent-education ICTs to provide parents with a better sense of existing tools and why to use them. It also argued for the revamp of parent-education ICTs to provide liaisons with better ways of monitoring parents' breakdowns and use. In this study, it became clear that, despite not really using imposed parent-school ICTs, parents work hard to orchestrate and secure resources for supporting their children's education. Existing literature has identified aspects of orchestration as different roles that parents undertake to support their children's learning, including monitoring children's school work, providing resources needed for schoolwork[12, 220]. The current research highlighted that participants not only prefer these orchestration-related roles over others like collaboration and acting as a teacher. Further, it shows that the reason behind this preferences is related to a desire to ensure a sense of making progress and regaining control over their lives in a foreign country. Parents' design concepts also stress that a future design direction that is valid and important for them is to further explore how ICTs can more effectively provide that sense of control: *Now: How to support parents' sense of control over the academic support they are providing to their children?*

Parents' designs suggested two specifications for that purpose. First, to provide intelligent alarms that let parents know when to act. Second, to offer immediate, step-by-step guidance not only on what resources to provide but how to use them. Parents' designs did not specify if parents require support for making meaning out of the resources they need

to secure (e.g., why they matter). However, their designs suggesting the use of consejos to help parents better grasp the inner-workings of the school system indicates meaning-making support for understanding educational apps might also be worth pursuing. From their designs, it was apparent that parents would accept immediate guidance from intelligent agents. It remains unclear if they would like to eventually connect and obtain guidance from with human actors too. Orchestrating is a strategy that parents use to maintain a sense of control and empowerment. Introducing human actors, and thus, potential judgment, might deter from that goal.

**Before: Enriching Knowledge About Resources in the Ecology** This design pathway proposed an intelligent interaction space working on top of parents' existing trustworthy communication channel with other actors. Interactions in the space would contribute to the growth of a shared repository of resources and experiences. In the case of Latin\* parents, the repository should receive updates from supporting organizations. The goal was for the space to intelligently draw from the repository for suggesting new, timely-relevant resources to parents.

Parents' capacity to negotiate trustworthy information through closeness confirmed most of the aspects that this design orientation proposed: it needs to be with a figure of authority and it needs to offer actionable information that parents can negotiate. However, parents' clear depiction of their limitation when trying to mobilize this capacity shed light on a novel but important design goal: to work towards diversifying not only the information but the information sources that parents rely on. Moving forward, this poses the question of: *Now: How to avoid depending on one actor of the ecology only?*

As this study showed, when parents develop a close relationship with a figure of authority in the ecology, they tend to rely only on one actor, which limits their possibilities to learn about resources that can be more convenient for them. The Comadre SMS agent is a previous assets-based ICTs that, drawing from a connect learning approach to education

[132], already proposed to tackle this issue [3]. Parents would register to an SMS service to receive notification of informal learning opportunities that are financially feasible for low-income Hispanic immigrant parents. While diversify actionable information for parents is helpful, the findings from this current study suggests an intelligent interaction space needs to work towards supporting parents in becoming independent information-seekers. Specifically, this study stresses it is essential to increasingly promote parents' connections with more, relevant information sources than just one. Thus, any intelligent interaction space that seeks to leverage closeness for diversifying information needs to also avoid making parents dependent on one source only.

### **Before: Remote Volunteering Apps Where More Parents can Engage with Liaisons**

Building on findings from Study 3 (see Section 4.3), this pathway proposed changing the volunteering model in schools, from co-located to remote. The concept entails an SMS app would allow parents to provide small digital contributions to schools and other organizations, and gradually acquire more responsibilities in the institution. Following findings indicating that liaisons need for hands to do their assets-alignment work and that working with liaisons is beneficial for parents' empowerment work, the goal of this concept is to close the gap between parents and liaisons. Such a proposal is already a radical departure from the traditional view of parent-education ICTs as mechanisms for figures of authority to share information with parents about children resources only [3, 20, 21, 22, 93].

Parents' designs emphasizing their capacities to learn and serve in activities that show a low risk for failure confirmed that remote volunteering could be an adequate ICT support for them. Parents' designs added expanded the view of the goals for design that these should pursue to better harness parents' capacities. The overall goal, as parents' experiences and ideas for the future showed, is for parents to find others they can trust, and rely on when needed, for information and beyond. A question worth pursuing then is *Now: How to motivate parents to connect and work together with other community actors?*

Parents' designs suggest that a possible way moving forward could be to enable aggregated contributions as an initial step towards participation. This would entail facilitating mechanisms for many parents to answer to the same question or make recommendations to solve a similar problem, and from there, generating short digests and sharing those with the entire community. Based on how parents' designs pushed for parent-to-parent direct connection, another possibility could be for micro-volunteering platforms to gradually recommend parents to engage in small online collaborations, and from there, to invite them to connect at a deeper level. For example, considering parents' capacity to convey value-based consejos, a project could be for parents to collectively generate a community brochure with their consejo-based experiences about how they understand the school system.

**Before: Knowledge-Sharing, Interaction Spaces for Liaisons** Parents' capacities to learn and serve also confirm the need for liaisons to have a more intelligent space to share experiences when working with parents. Given parents' experiences and designs, however, indicates that an important design question is *Now: How to support liaisons in fostering parent-to-parent collaborations?* Specifically, parents' experiences stress that liaisons need to learn more about how to motivate parent-to-parent collaboration in ways that parents find rewarding and empowering.

### *Next Steps*

This study is one of the first shedding light on parents' views of their strengths and on their ideas of how to potentialize those strengths to change how the educational system relates with them via ICTs. All participants' concepts, however, entailed the support of figures of authorities validating the knowledge they share and the connections they establish. Further, many of the design questions that I propose in the previous section also involve the participation of liaisons, schools, and supporting organizations and the need for them to revise their practices. A critical question to explore next, thus, is how these actors envision

participating in initiatives that potentialize and augment parents' strengths.

Ideally, parents and other actors would join efforts during Participatory Design workshops to discuss feasible pathways moving forward. However, power differences complicate such a possibility. A potential next step, thus, would be to find ways to transfer the knowledge of parents' capacities to institutional actors and motivate them to design while prioritizing parents' goals and visions of the future.

## **5.2 [Study 5] Designing with Institutional Actors: Translating Assets from Parents to the Educational System**

### 5.2.1 Introduction

ICTs play an essential role in how educational systems expect parents to access and manage resources for supporting their children's education [21, 23, 93, 134]. Most parent-education ICTs, however, struggle to respond to the information and technology practices of families from nondominant groups [3, 20, 23]. As a result, ICTs end up contributing to the deficit-based view that many actors in the educational system already hold about parents from these groups. Using an assets-based approach to research and design and working within the context of low-income Latin\* immigrant parents, this research seeks to inform a critical shift in how parent-education ICTs are designed and adopted, going from being an institutional imposition to critical supporters of parents' strengths and capacities. A three-year ethnographic fieldwork within an U.S. American educational system and a one-month PD engagement with parents already highlighted pathways to attain that shift. Pursuing such transformational pathways, however, is almost impossible without the support of actors within larger-scale systems [184, 185, 195]. After all, it is institutional actors the ones promoting the information and technological practices that define parent-education interactions and thus, any effective change needs to help them revise their motivations and actions.

In this study, I report on an initial effort to connect parents' insights and views for future parent-education ICTs with institutions in an U.S. American educational system. In particular, I describe the results of four PD sessions with 32 institutional actors, including bilingual parent-school liaisons, after-school and parenting program coordinators, and members of a software company producing parent-education ICTs. In these sessions, we progressively iterated on imagining pathways for the educational system to embrace and support parents' views. As such, I explored the following research questions:

- RQ1 What systemic actions do different educational system actors recommend for supporting Latin\* immigrant parents' capacities and visions for the future of parent-education ICTs?
- RQ2 What are the concrete design pathways for parent-education ICTs that different educational system actors see as desirable and feasible for supporting and augmenting Latin\* immigrant parents' capacities and aspirations?

In answering these questions, this study makes two critical contributions to existing work on the design of parent-education ICTs. First, it defines possible working routes for forming alliances that can drive changes in how the educational system connects and shares resources with parents while respecting and prioritizing parents' capacities. Second, it offers two concrete design concepts for parent-education ICTs, which embody the recommendations and visions of the future of multiple actors working at different levels of political action. In addition, in Chapter 6 I will discuss how this study also expands existing HCI understanding of how to facilitate an assets-based design process that involves institutional actors.

### 5.2.2 Re-Imagining Parent-Education ICTs: The Role of The Educational System

Educational systems in the U.S.—which for the purpose of this study includes formal and informal educational initiatives, and the many institutions and individuals acting in the periphery—play a critical role in determining the information management and technological practices that parents are expected to adopt [66, 102, 200, 281]. School admins have increasingly demanded that parents regularly check their emails, SMS messages, and social media platforms to keep track of school-related news [22, 23, 200]. Per classroom, teachers inform parents—with little to no room for negotiation—the apps they should use for communicating classroom information, such as behavior, grades, volunteering options, and classroom events. Further, parents need to become somehow familiar with the apps that



children will use to support their learning endeavors [63, 102, 131]. The reasons behind these decisions are diverse and intertwined, almost always favoring the operations of the larger-scale institution. ICTs can reach families en masse [20, 200]. Also, technology-based communications are easier to track and take less physical resources and time to disseminate than paper-based communications [22, 200]. Further, there is an important industry of software vendors offering schools ICTs that especially respond to their curricular and data monitoring demands as well as to their privacy policies [66, 282].

As the four previous studies of this dissertation have shown (See Chapter 4 and Section 5.1), these imposed ICTs—especially the ones supporting parent-education communication—are not working well for all parents all the time. They are significantly detrimental for parents from non-dominant groups, who might have multiple differences from mainstream society. Given the vital role of the educational system in normalizing parent-education ICTs, it becomes critical to work with members of the system to explore possible action for the system to support the transformations that parents see needed from the ground up.

As a research field, Education has a long history of trying to effect change in how technology supports learning across the large-scale educational system [283, 284, 285, 286]. Stemming from alliances between universities, governmental agencies, NGOs, private companies, and community representatives, most projects have sought the creation of different out-of-school points of intervention for engaging children from underserved communities—and sometimes teachers—in using technology for different learning goals, from discovering and pursuing an interest in computing [285], to fostering their creativity, and expanding knowledge on science, math, and engineering [287]. Some of these initiatives, like FabLab@School in Denmark, and GAComputes! in the U.S., have had significant impact in public policy at an institutional level, especially shaping new courses and curriculum standards.

Changing how educational systems adopt parent-education ICTs, however, is a pending endeavor. Although the literature on parental mediation of technology in children's

learning is vast [12, 27, 45, 63, 64, 220, 288], existing research efforts have especially focused on understanding technology's role in the parent-children dyad. Less is known about how large-scale systems shape parents' mediation practices. Moreover, in the context of immigrant parents, there is a need for more initiatives that foster alliances between parents, NGOs, school staff, and school district members, to understand, envision, and enact systemic changes.

The efforts mentioned above to make curricular changes for technology and learning are a useful reference towards that needed work. However, when working with parents from non-dominant groups, power differences are a more critical factor: language, cultural, educational, and socio-economic differences complicate possibilities for parents to engage in alliance-formation work from the get go. Thus, it remains essential to find methods for exploring alliances and possible institutional changes that maintain the voices of those most vulnerable in the system, at the center of the process at all times.

### 5.2.3 Methodology

This study follows a three-year ethnographic fieldwork in 16 locations across the city of Atlanta with over 300 Latin\* families (see Chapter 4) and a one-month PD engagement with 30 Latin\* parents from a low-income background (see Section 5.1). These inquiries generated critical insights about parents' assets, information flows supporting—or deterring—parent-education communication channels, and four directions to further explore for designing parent-education ICTs that could respect, leverage, and argument parents' assets.

The next step was to explore these directions with actors in the educational system. However, during previous work I learned that, for parents, engaging in design with multiple stakeholders, especially those they see as figure of authorities, would probably be counter-productive. The Latin\* immigrant parents I did research with, tended to feel outpowered in context that were too culturally- and linguistically- distant from theirs and this were much

more so if meetings happened in places where power relations were constantly reinforced (e.g., schools). The current study, thus, proposed to deal with these power differences by undertaking the responsibility of introducing parents' insights to institutional actors and supporting them in designing with these insights in mind. As such, I, as a researcher, undertook the role of an initial mediator between parents' voices and institutional actors. My expectation was to eventually take the results of this study back to parents and gradually work with them in creating prototypes that they could use as artifacts for communicating their aspirations to macro-level decision makers in the educational system.

Across four 3-hour PD sessions (11/19-03/20), I worked with 32 system actors operating at a meso-level in their institutions. That is, they are not in full power to make institutional decisions but can easily transfer ideas of change to their everyday practice supporting families and to macro-level actors in their institutions. The system actors recruited included bilingual parent-school liaisons, after-school and parenting program coordinators, and staff from a software company producing parent-education ICTs. Iterating on the design pathways and questions generated in previous studies, these PD sessions explored institutional actors' view of desirable and feasible alliances and forms of support for changing the role of ICTs in how the educational system interacts with parents.

In this section, I describe the recruitment process for all four sessions, provide a rationale for each session, and describe the activities conducted in detail, and how I worked to facilitate them.

### *Recruitment Process*

The process of recruiting participants for all four sessions was determined on the go based on the results of previous sessions, recommendations from previous participants, and the emergence of new connections with system actors.

During the studies I conducted previously, I was able to establish trusting relationships with bilingual school liaisons, after-school program staff, and staff from diverse NGOs

working with Latin\* families. As part of the fieldwork, I kept these participants informed about existing findings and research activities, and, upon their request, I frequently facilitated technology talks and workshops to the families they serve. For Session 1 (Nov 2019), 3 (Jan 2020), and 4 (Mar 2020), I recruited participants from that pool of contacts (10, 4, and 3, respectively). For Session 1, I invited 16 participants, of which 10 attended. The original plan was to only host that one session. However, given that there important questions to continue exploring and that 6 critical system actors could not attend, I decided to iteratively explore the missing questions in small-group sessions with the missing participants. Although I tried for each session to have an evenly-distributed mix of school and NGO actors, this was only possible for Session 1 and 3. Participants' clashing schedules led to conduct Session 4 as one with only members from the same NGO.

The recruitment process of Session 2 (Dec 2019) was different from the other sessions. I purposefully sought a connection with Company (name anonymized), a company producing a parent-education ICT I had learned about through a participant. This piece of ICT was aligned with some of the design guidelines I had seen as important during my work. Their experience working with different school districts nationwide was relevant for exploring next feasible steps for changing the system in ways that align with parents' assets and aspirations. After learning about my findings, the company's CEO asked me to travel to their headquarters and facilitate a design workshop to 15 members of the company's staff, including product managers, software developers, product sellers, and product-school liaisons. We coordinated the dates so that the workshop happened after Session 1 and, thus, could use the insights from that session as input.

Table 5.3 provides details on participants' roles and gender.

Table 5.3: Details of Sessions and Participants

Session	Dates	Groups	Participants' Roles	#Participants (Gender)	Age Range	Countries of Origin
1	11/19	DT1S1 DT2S1 DT3S1 DT4S1	School Liaisons After-School Program Admins Staff or NGOs Supporting Immigrants' Rights	10 (9 W, 1 M)	40-55	Venezuela Colombia Puerto Rico Cuba Honduras U.S. Dominican Rep.
2	12/19	DT1S2 DT2S2 DT3S2 DT4S2	Staff of a Software Company	15 (10 W, 5 M)	25-55	U.S.
3	01/20	DT1S3 DT2S3	School Liaisons, Parenting Program Admins	4 (4 W)	25-55	Venezuela Colombia Dominican Rep. Bolivia
4	03/20	DT1S4	Youth Mentoring and Parenting Program Admins	3 (1 W, 2 M)	25-55	Puerto Rico U.S.

*Sessions' Goals*

As explained before, each session iterated on the previous one, each pursuing a specific goal for moving ideas forward. Session 1 was planned as an exploratory space for institutional actors to learn about parents' assets and imagine changes in ICTs and the educational

system that respect and leverage those assets. Session 2 pursued a similar goal but was directed towards involving the perspective of software industry's representatives. In both sessions we worked on the design directions and concepts that my previous work with parents had unearthed as important for supporting changes in parent-education ICTs. These initial design directions were framed to participants in terms of the following questions:

- How to support parents' sense of control over the academic support they are providing to their children?
- How to motivate parents to connect and work together with other community actors?
- How to support liaisons in fostering parent-to-parent collaborations?
- How to avoid depending on one actor of the ecology only?

After Session 1 and 2, I analyzed the design artifacts that these two different groups of actors had generated and their discussions about next steps to identify the main areas of agreement and the conflicts for moving towards feasible assets-based parent-education initiatives. Two key aspects that participants all agreed on were that a) a critical issue to keep exploring is how to support parents in engaging with different actors across the educational system; and b) actors across the educational system could highly benefit from strengthening their connectivity and information-sharing abilities. As a result, and based on the design directions that participants iterated on during these two sessions, I reduced the number of design questions from from 4 to the following 2:

How can a smart conversational agent support parents and other system actors in enriching their knowledge of situated resources for supporting children?

What technology-supported volunteering systems could lower participation barriers for parents to incrementally support each other, building stronger communities?

To further explore the implications of these directions for the educational system, I organized two more design sessions. As mentioned before, participants for these sessions were recruited from the set of original invitees to Session 1. In these sessions we worked around finessing the design concepts already explored in previous sessions and envisioning forms of support and alliances that these concepts would require for moving forward.

### *Sessions' Activities*

Although session goals depended on who the participants were and the stage of the process that the session took place in, to work along the lines of an assets-based design process, all sessions followed a similar format. This entailed rearranging participants to work in small design teams and proposing each group to engage in three stages with different activities per stage. Table 5.3 details the number of teams per session and the codes that will be used to refer to each. The *first stage* worked to familiarize participants with the goals of an assets-based design process and recognize parents as assets-based beings who also face challenges. The *second stage* entailed design activities where participants were given one design direction, and design aids that constantly reminded them of parents' assets and design ideas. The *third stage* allowed participants to present and discuss their design ideas and connect to how those ideas spoke back to the future of the educational system, the forms of support required, and next steps to secure that support.

The amount of time, number of supporting facilitators, and activities per stage, changed based on the session goals, which were also determined by learnings from the previous session. Given that Session 1 was the first time I transferred parents' insights to institutional actors, I invested more time and facilitating resources to activities during first stage of the design process. Four additional researchers worked with me in facilitating the process, each supervising one design team. I also provided a large set of assets-based design objects to support participants' design activities. For Session 2, I decided to rearrange the timing and constrain the design resources I provided to participants. The goal was to give participants

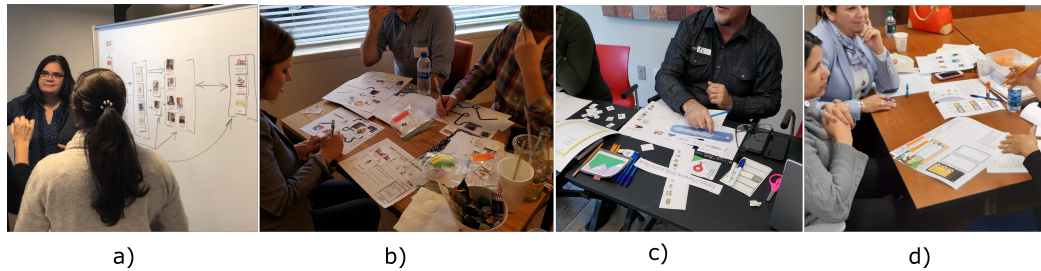


Figure 5.7: Participants working across sessions a) Session 1 with school and program liaisons, b) Session 2 with software company, c) Session 4 with NGO supporting Latin\* immigrants, d) Session 3, with school and program liaisons.

more time to engage in the design process while factoring in parents' designs, and discuss the artifacts they produced. Given this session took place outside of Georgia, no other facilitators were present at the session.

Since the goal of sessions 3 and 4 was to finesse the inner-workings of the design concepts proposed to date, I relied on more visual and less hand-on-activities for facilitating the first phase of these sessions (e.g., showing participants video prototypes of the concepts). For the second phase of both these sessions I presented participants with use scenarios that needed to be completed. Thus, the design aids representing assets that I provided to each design team were highly limited to the particular scenario. One additional researcher worked with me as a facilitator for these sessions.

For all sessions, the third phase took place in highly social spaces, like lunch times in restaurants, where participants could relax and engage in informal conversations about their ideas and emotions in regards with changing the educational system. Figure 5.7 shows images of the different sessions as participants engaged in the design stage.

### *Data Analysis*

Data for this study was collected in the form of notes taken during and after each session, videos of participants' presentations, and design artifacts. The data was collected in Spanish and English, depending on participants' language of preference for expressing their ideas and designs. As mentioned before, a first round of data analysis took place after Ses-



sion 1 and 2. Following an inductive and interpretive process, I coded the data thematically identifying emerging patterns relevant to participants' goals and struggles when envisioning forms to support parents' assets. The data under these patterns suggested that there were two critical concerns for participants moving forward, both related to enabling meaningful human-to-human connection in the educational system. From there, I narrowed down the design questions I later proposed to participants in the next two sessions.

When all sessions were finalized, I conducted a second round of data analysis, this time considering the data from all four sessions. Again, I coded the data thematically. Emerging patterns pointed out at participants' view of the design problem as one of ICTs providing meaning-making support for institutional actors first, and parents later, with codes such as 'visibility of liaisons' work', 'engaging in more concerted efforts', 'avoiding introductions of more meaningless ICTs to parents'. A second round of thematic grouping led to the larger themes describing the future actions that participants see as feasible and desirable for prioritizing connectivity over information dissemination: 1) raising awareness of the work being done in the system; 2) building working connections amongst institutional actors; 3) ensuring ICTs for parents are locally-meaningful; and 4) revising how ICTs are managed and by whom.

#### 5.2.4 Findings

The sessions' emphasis on analyzing assets and challenges as they operate in the educational system, motivated participants to critically reflect on how parent-education ICTs impact parents' lives. Progressively—within and across sessions—participants' designs and discussions pushed towards ICTs that would support meaning-making for institutional actors and parents rather than fixing their information-dissemination problems.

Participants in Session 1, for example, expressed distrust towards ICTs as the means to support parents' relation with education. By imposing installation and registration, technology, they pointed out, has created more problems than solutions. For them, it is much

more critical to support parents in making meaning of their environment, so that they can “realize what they are capable of, and feel welcome and that their voice matters.” The focus on meaning-making led participants in Session 2—the staff of a software company—to reflect on the critical issues that their parent clients often face when trying to understand the goal and ways in which their product fit parents’ everyday lives. For participants in Session 3, a key problem with the way ICTs operate in the educational system is that they operate “as black boxes, prompting more questions than answers about how these apps benefit parents.”

As a response, across sessions, participants worked towards a new paradigm for parent-education ICTs in the educational system. I now describe the directions and implications that participants suggested for attaining such a different vision, including the tensions they envision in the process and the possibilities to navigate them. Specifically, participants’ accounts, design activities, and discussions afterwards shed light on two possible purposes for ICTs in the system: for helping institutional actors in making meaning of the educational system, and directly offering meaning-making opportunities to parents. Their work also suggests the roles that the different actors in the educational system, including parents, can take in supporting meaning-making goals for ICTs.

### *Meaning for Institutions*

Parallel to the conversation on designing ICTs for supporting parents in understanding the educational system, a discussion on the role of institutions in supporting meaning-making processes for parents also took place. A common goal across teams was to ensure that any ICT-enhanced interventions could operate on and support “new ways of collaborating amongst institutions” (DT3S1) and “agreements for future directions that resonate with the rest of the community” (DT4S1). Such a desire motivated participants to critically unpack how institutional actors were reading, or making meaning, of parents’ experiences in the system. For example, when discussing parents’ capacity to negotiate meaning via

close, one on one interactions, DT4S1 and DT1S3 both touched on the fact that cultural differences and institutional policies often prevent institutional actors from reading parents' desire for closeness as a capacity. Participants in DT1S3 explained this further:

*It is not only teachers who sometimes do not know how to engage with parents when they insist on closer interactions, it goes beyond that. Some times, to reinforce privacy policies, school principals forbid communication in media that actually work for parents, or establish super bureaucratic processes for disseminating information to parents, and so one-on-one communication becomes less feasible.*

Some teams, thus, aimed at discussing and designing tech and non-tech initiatives that can support institutions in understanding parents and other institutional actors, so that better collaborations can take place. Two concrete possibilities emerged from these discussions: raising awareness about the reality of the system, and building working connections amongst institutional actors.

**Raising Awareness About the Educational System Inner-workings** For teams such as DT4S1, the problem of institutions and institutional actors (e.g., teachers and school principals) not being able to understand and respond to the reality of immigrant parents, is a non-tech-related problem: “What we need to do is invest more in educating the staff about how to interact with parents, and why certain policies cannot apply to all groups.” In a later discussion amongst all design teams, members of DT3S1 who explored how to support bilingual liaisons' efforts to empower parents, further described the type of awareness that institutions should develop:

*You have no idea how many times I have asked for support to motivate parents to attend activities at school, support for reward systems, more space, more flexibility to act when needed, but it is useless. They [authorities] do not understand the problems we are dealing with here. We need somebody like you*

*[referring to the researcher] to show the school district the reality of our work. They simply do not understand the relevance of what we do and why we need different resources than other groups to actually help parents.*

Their perspective suggests that the problem is not only about institutional actors' lack of understanding of parents' communication capacities. These actors also struggle to understand how other institutional actors support parents and the resources they need to put empowering initiatives in place.

As design concepts progressed along sessions, participants began imagining how technology could support institutions to make meaning of the educational system's inner-workings. In iterating on the concept of a chatbot for enriching information dissemination in the channels that parents trust (e.g., WhatsApp groups with NGO leaders), DT1S3 explored the possibility of using this intelligent agent as a way to keep institutional actors more aware of how other actors support parents. In their experience, "school principals tend to be more flexible when they are aware of the cultural and socio-economic factors that shape the actions of the entire school community."

The design idea entailed the agent periodically sending short digests to institutional actors like school principals and decision-making authorities in school districts, about the topics discussed in the channel, helping them to further understand how the system interacts with the community, what activities it supports, and which it could support more. It remains important, however, to take this concept back to parents and further explore parents' views of how their everyday online interactions with institutional actors could be summarized and presented to institutions. Further, school districts could also engage in envisioning the type of information that could help them better understand the efforts of parents and other institutional actors in strengthening parents' relation with education.

**Building Working Connections Amongst Institutional Actors** After learning about parents' capacity to seek empowerment via learning and serving others, many teams ex-

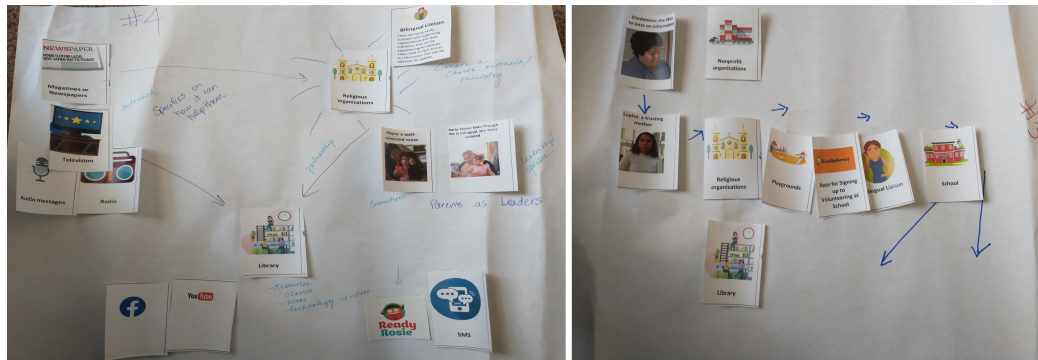


Figure 5.8: Concepts of Session 2 where participants proposed building connections across institutional actors.

explored how to leverage that capacity by fostering working connections amongst institutional actors. Teams such as DT1S1 started touching on this goal by discussing the possible tensions that could arise if ICTs worked to support schools and community partners in collaborating around disseminating resources for parents. Given schools’ rigidity, participants felt that such collaboration would demand community partners to abide to schools’ policies and collaboration goals. In Session 2, teams such as DT1S2 dealt with that tension by moving entirely away from considering schools as part of the collaboration. They rather explored concepts where institutions such as churches, schools, and libraries, could facilitate parent-led initiatives sharing parents’ knowledge about a certain topic (e.g., how to use a particular parent-education ICT or which math resources to use for supporting children, see Figure 5.8).

Session 4 participants, who are all NGO staff, re-engaged with the possibility of ICTs intervening in how community partners collaborate to support parents. They proposed ICTs to enable institutional actors for finding each other and from there, organize the type of initiatives that Session 2 teams had envisioned. Jose, from DT1S4 shared:

*If it is a matter of deciding right now between investing in ICTs that allow us to communicate with parents or ICTs that allow us to learn about and engage with other organizations, I’d choose the latter. It is true that sending information to parents might be a struggle but that is something that we need to keep*

*doing personally anyways. However, it'd be ideal to know what others are doing and, more importantly, what they have that we can share and how we can connect with each other. Once we have that level of connection, we can start thinking about ways for tech to connect all of us with parents.*

Participants' design experiences suggest that it is critical for designers of parent-education ICTs to reconsider their target audience. As mentioned at the beginning of this section, ICT products that try to address parent-school communication needs tend to obscure meaning for parents. Reconsidering schools' role in ICTs as primary users and rather stressing and augmenting the collaborative power of other institutional and community actors might be a more productive pathway. However, this entail gradually defining who actors to include and what role to assign them in these collaborative platforms. For example, for DT1S3, it was clear that businesses such as Publix and Chickfil-A should also be members in a collaborative system between institutional actors; business often offer free-meal options and make donations that can be useful for organizing appealing events for parents. The level of participation that is expected of this more peripheral actors is yet to be defined.

### *Meaning for Parents*

As described before, the design process led many participants to rethink the target audience for new parent-education ICTs in the system. Across sessions, participants stressed how introducing ICTs for parents has not proven to be entirely successful so far for they tend to obscure meaning-making possibilities for parents. DT1S3 explained this problem in more detail:

*Most parents, when they receive the suggestion to install a new app, see these apps as black boxes, with no idea what goes in, what comes out and what happens inside. And so, they imagine all kinds of things about how these apps, like many fear that if they send a message there, all parents will see it, or more*

*than one teacher, and so on. The result is that they don't use the app, and choose not to participate actively.*

In addition, for most participants, ICTs were an obstacle rather than a support for what they considered one of their most relevant strengths: their ability “engage in personalized interactions” (DT2S1) with them. Indeed, such an ability aligns with parents’ capacity for negotiating information via closeness. Participants in DT4S1 reflected on ICTs’ relation with the need for close interactions:

*When parents receive emails, for some reason the email does not feel as real as getting a call from somebody who knows your name. Or even getting a reminder on the email does not have the same effect on parents like when she calls them, talk to them by their name, which makes them create this sort of commitment.*

For participants in DT1S4, it becomes critical to start re-thinking existing ICTs’ goal to only patching communication gaps. From their perspective, new parent-education ICTs need to work towards really supporting—although not replacing—closeness. Jose explained the implications of working towards such a goal:

*It is true that contacting and engaging with so many parents is hard for us, but it is something that we need to keep doing anyways. It is what actually makes things work. If we introduce technology to send information to parents, it needs to work in parallel with us, rather than trying to replace us.*

Some designs addressed precisely this need for ICTs that support meaning-making by promoting spaces where parents and others actors can engage in close interactions. Specifically, these design ideas addressed three aspects for these ICTs to consider: the type of *content* that ICTs can disseminate to parents, the quality of the *interactions* they can offer, and the way of *introducing* these ICTs to parents.

**Content** The design concepts that participants proposed for disseminating information to parents stressed prioritizing content that 1) was not limited not only to school-related information but to education in general; 2) can eventually lead parents to develop meaningful connections with other parents; and 3) foster co-located interactions community members at their local areas.

In terms of the topic orientation of the content that actors saw suitable for parents, DT1S3 summarized why content for immigrant parents requires to go beyond educational resources only.

*We tend to think that to support children, we need to share only educational resources with parents. That is not the case for the immigrant community. Basically any resource is indirectly related to education, leisure is related, sports is related, daycare is related, many things are related. So any ICT delivering content to parents needs to take a more holistic view of what information to disseminate.*

The different design work happening across sessions suggested that this holistic-type of content can take different shapes, included resources and solutions to parenting problems in general (e.g., “daily camps at no cost for those days when classes are cancelled” - DT1S3), local events (e.g., schools and churches promoting ministries for parents, DT1S2), and video-based micro-tutorials about how different aspects of the educational system operates (DT3S2 and DT1S3).

Another aspect related to content that different design teams iterated on was to make sure that the content shared could motivate parent-to-parent collaboration. This was a response to parents’ designs highlighting a strong capacity to serve and learn but also to foster more trusting connections with other parents. DT4S1 suggested to engage parents in projects of their interest that would benefit the community, such as asking them to put together a cookbook with their best recipes. Recognizing that, due to fear of failing, most parents reject committing to co-located participation, DT2S3 and DT1S4 explored how



ICTs could help parents to collaborate rather remotely. They concluded that requests for remote participation should ask very little of parents, individually, and only propose them to collaborate with others after a parent has contributed several times to a particular project. Amongst the type of projects they saw as desirable for eliciting collaboration were organizing local events such as Hispanic Heritage Month Celebration, and putting together monthly publications about topics such as disciplining children.

Both teams, however, stressed that any collaborative project should lead all collaborators to eventually meet, face-to-face. As DT1S4, such meetings help organizers come together more, and develop real connections: “It cannot all be work, people need to meet and celebrate what they are achieving.” Introducing elements that elicited a move from digital content and interactions, to on-the-ground, face-to-face connections was a rather common trend across all designs (Figure 5.7 and 5.9 ). DT1S3 and DT1S4 explained why this remains important for ICTs supporting immigrant parents:

*When sharing resources, location is essential, and to that, I would add it'd be ideal not only to show distance from current location but transportation options and also who they can talk to when getting there, and if they speak Spanish or not. (DT1S3)*

*The main thing about any resource that an app might share with parents is to make it super clear where they need to go to access it. The idea is that any resource should help bring parents closer to the community. (DT1S4)*

**Forms of Interaction** Another aspect that teams discussed, was how ICTs should interact with parents when delivering information so as to support the closeness needed between parents and other human actors. Based on previous studies, from Session 1, I introduced participants to the idea of chatbots as possible assistants for their interaction with parents. The introduction of a smart agent was a very exciting possibility for all participants, particularly because of its ability to leverage parents' capacity for orchestrating resources for

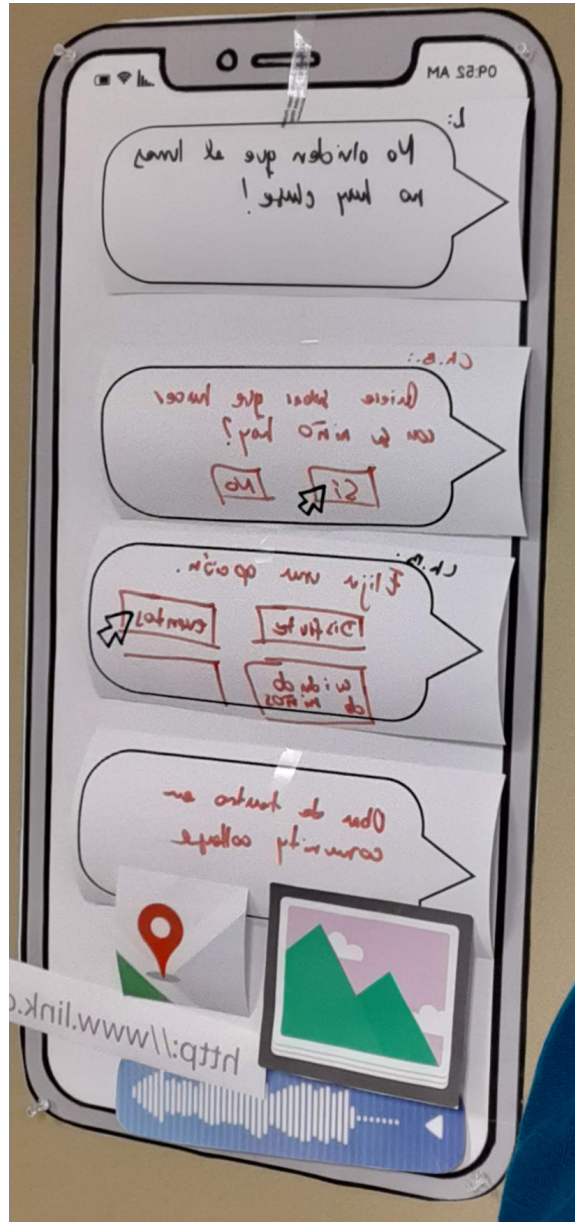


Figure 5.9: Design created during Session 3: Location of on-the-ground sources of support is shown as key in this design.

children. This comment during a conversation after DT4S2's presentation shows the potential that many participants envisioned in smart agents:

*We want it to suggest resources that are exactly appropriate for better monitoring the kid. Like, here is your feed for your communication apps, here is the child's activities, today he was assessed and here are three results.*

However, it was during Session 3 and 4 that teams fleshed out more details about how such interactions should take place. DT1S3 and DT1S4 shared the notion that a chatbot should work as an assistant for institutional actors, never a replacement for them. Confirming previous findings (See Sections 4.2 and 4.3), these groups insisted that a chatbot needs to act in the private channels that parents already share with trusting institutional actors, where parents can feel free to discuss delicate topics. Participants were also very adamant in describing how chatbot's interactions could complement or enrich existing human-human conversations by showing conversational manners similar to the ones that institutional actors use. This includes using "language that is not too sophisticated, but more relatable for parents," "short messages that keep information simple," and "conversations that go from less to more." That is, only increasing the length and complexity of messages as the conversation with parents progresses.

In addition, for DT1S3 it was essential for the chatbot to always interact with parents by providing them with multiple options: "It is easier to answer a question that offers possible answers already, there is less risk for misunderstanding." For example, if the chatbot asks parents about new resources, or events they would like to help with, or recommendations on other parents who would want to participate in a meeting, the chatbots could draw from a repository of information and present parent with possible answers already.

Finally, to respond to parents' different capacities to process information, participants in DT1S4 envisioned chatbots interacting via various modes of communication, including audio and video.

*Parents often have their phones with them as they are working, and generally use their phones to listen to music while they do their jobs. Voice notes and videos are great in those cases, they can do several things at the same time.”*

**Introduction to Parents** As mentioned before, across sessions participants shared a general concern that adding another app for parents would complicate rather than simplify information access and connection-building. DT4S2 stressed that, before adding a new app, it is critical to think “how do you get them [parents] into another app? cause it’s just getting overwhelming with them having to download something else, and sign up, and all of that.” For DT1S4, the solution cannot be “yet another app that parents won’t want to use.” In exploring different alternatives for ICTs that support meaning-making, many teams discussed important considerations for progressively but more effectively introduce those technologies in parents’ lives.

A key aspect that previous studies suggested as relevant (See Sections 4.2 and 4.3), and that participants confirmed, is to avoid disrupting parents’ lives with the intention of adding new processes that are foreign to their everyday goals and practices. ICTs, participants proposed, should leverage and augment the capacities of those channels that already exist and that already work for parents. Participants’ design work, however, suggest that negotiating which channels to use is can entail a critical conflict in the educational system. For many participants, WhatsApp provides all the characteristics they need: it offers familiarity to parents, it does not require a complicated installation or registration process, and it allows for text, audio, and video sharing. For other liaisons WhatsApp invites too much informality; institutional actors must share their phone number with the community and that can lead to undesired interactions. Many proposed Remind, and others proposed ClassDojo. A pending challenge would be to explore the creation of agents that could become part of any of these apps and augment its meaning-making capabilities.

Another concern for participants, especially during Session 2, was that parents could

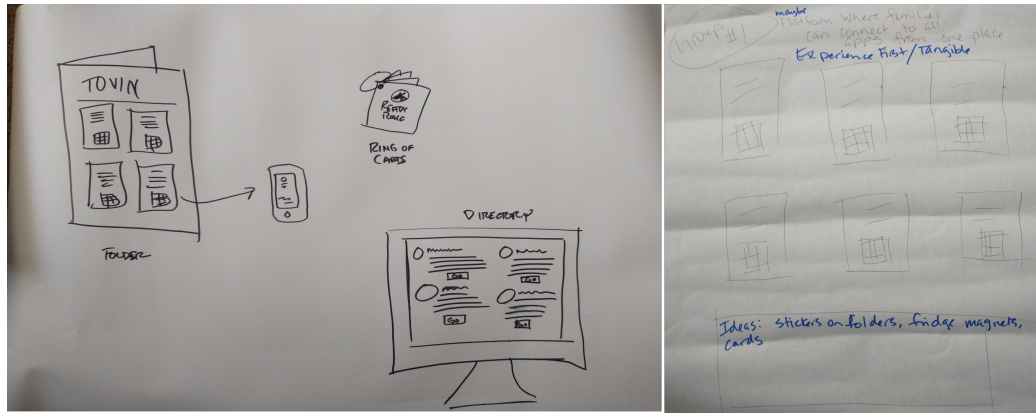


Figure 5.10: Design produced in Session 2: A folder that parents would receive the first day of class with QR codes leading to videos explaining each parent-education ICT.

disregard ICT services—even if they operate in familiar platforms—due to the services’ inability to convey an added value to parents’ everyday goals. DT4S2 presented several ideas of how to address that, all around the notion of rethinking the time for technology to enter parents’ lives, and actually devoting time and effort to championing relevant meaning-making actions before technology becomes part of parents’ lives.

*Maybe one of our principles needs to be that we need to define a different entry point than technology. It’s interesting to see how all the teams have come up with similar ideas around thinking that yes, we are getting to technology but it’s not technology first. We’ll get there through something more tangible or real life experience.*

In that line, one of their concept was a folder that parents would receive at the first day of class, with a page with different QR codes, one per parent-education ICT, enabling parents to visit a video explaining what that product is for and why it could be beneficial for their children (Figure 5.10).

Another one of their concepts tackled the issue of asking parents to register before using technology. As they shared, registration has been a constant constraint for parents’ willingness to adopt their product, which entails a digital library of short videos modeling

learning-based activities for parents to do with their children at home. DT4S2's second concept called for reconsidering the time and even the need for a registration step.

*I picture almost the flyer that we send home, before we even introduce our product, it can be literally four videos on a piece of paper that says 'Having trouble with discipline?', 'Having trouble with reading?', and for each question there is a video right there that they just watch for relating to the problem and understanding what this solution even is, before thinking of getting to the technology.*

During the next sessions, teams like DT1S3 and DT1S4 also called for removing registration as a requirement for parents to experience what ICT services can offer: "They [parents] could enter and use these services with an anonymous profile. In that way they can start experiencing and contributing to the service right away and trusting it with no privacy concerns" (DT1S4).

For DT2S2, it was also critical to rethink where to present ICT to parents. Instead of being the school, which is the space where most parents hear about parent-education ICTs for the first time, they proposed locations where power differences are no longer in place, like the playground:

*Families are already at the playground, so it makes sense to go where they already are. And once we are there and show these apps to parents, we can get them to try them and talk to them about what these apps do, how they could be useful. Parents can also connect to other parents that have similar questions or parenting styles.*

Future work would need to explore the type and locations of pre-ICTs meaning-making actions for supporting ICTs to become part of parents' lives: In what other ways can pre-ICTs actions support parents' engagement with ICTs and with the educational institutions

that seek to support them? Also, in the spirit of supporting parents' ability to connect with the community, what role can parents have in supporting this process?

### *Parent-Education ICTs for Meaning-Making: Responsibilities and Management*

As the sessions progressed and design concepts became more clear, participants discussed management aspects of the meaning-making ICTs they were suggesting. In particular, all concepts—regardless of the target audience—proposed ICTs that relied on repositories of multiple users' past experiences. These ICTs would be smart enough to later draw from such repositories to issue timely suggestions to users. ICTs would also gather information from users and use it to keep repositories growing in size and relevance. A pressing question for participants, thus, was: what actors should take responsibility for how these ICTs operate, including the content they store and share, and the updates they need? Participants' discussions suggest two critical areas to consider when determining responsibilities around management: the coordination of meaning-making processes for parents, and the development and maintenance of new ICT apps.

**Parents as Coordinators of Meaning-making Processes** A critical tensions among participants took place when defining the role that parents should have in how ICTs operate. School actors struggled to envision parents as active participants in ICTs, acting as valid information sources rather than static receptors of information. NGO actors and even software company staff, in contrast, continuously pushed against the rhetoric of schools being in control and parents following schools' suggestions as the only way for parents to be informed. They not only wanted parents to be more active as information-disseminators, they proposed to work for helping parents become leaders of their own information-sharing processes.

The interaction amongst Diana and Elena—a manager from an out-of-school STEM program and a bilingual school liaisons—when designing ICTs that provide community-



Figure 5.11: Discussion during Session 1 about the role that parents should have in new ICTs that diversify information sources for them.

resources to parents, highlights how the institutional nature of schools hinders their ability to support different participation paradigms for parents (See Figure 5.11).

DIANA: I really think we should to try to find ways for supporting the spaces where we know parents are already exchanging information [referring to churches, zumba classes, bus stops, and so on].

ELENA: But at the school we already have channels that send information to parents. All we have to do is to create channels for community partners to send their information to the teacher and she can then decide who to send it to.

DIANA: Hmm, the problem I see with that is that the parents who are already not



present because they don't want to be, won't want to participate more just because we add more information channels.

During design activities, school actors DT1S3, and DT2S3 highlighted the critical resources that schools can provide, and thus, the reasons why they are constantly positioned as the managers and leaders of any initiative for supporting parental engagement: “schools can directly and more easily reach out to parents who are interested in educational resources, they have their emails, phone numbers, and many school actors have already established direct communication channels with parents.” While most NGO actors and software company staff in all sessions recognized this to be true, they constantly sought to propose new working paradigms that would recognize schools' relevance while recognizing other actors' importance as well. For example, DT2S2 proposed that liaisons could work with coach moms who can gather other parents' experiences and sharing these with the rest of the school. Diana, a parenting-program coordinator from DT2S3, advanced these ideas by proposing a different way of understanding the leadership of initiatives that support parents:

*Each institution has access to a different pool of participants in the same geographical location, and each institution has a different type of bond with each parent. If what we want is for parents to make sense of their surroundings, to learn about all institutions and resources, then, institutions should rotate in leadership. First it can be the schools, but then the next time it can be the library and the next time it can be the church and so on.*

DT1S4's iteration on DT2S3's concept addressed another aspect of moving away from a school-centered model. They emphasized to revising the role of parents in parent-supporting initiatives. Their experience as a large NGO working with parents led them to make a call for not losing sight of the end goal: to support parents in becoming *independent* meaning-makers of their surroundings.

*Institutions like us, we can surely motivate these initiatives at first, but always with the parents. Increasingly though, the idea should be that parents form committees and that those committees end up being fully in charge of organizing these events or spaces, not us.*

Some aspects that need further exploration, however, are how to ensure that parents become willing to embrace such leadership roles and the role that schools should undertake in a such a parent-led model for content coordination.

### **Managing ICTs' Development and Maintenance via a Consortium of Institutions**

Other questions that participants, specifically those in Session 3 and 4, explored, were who should be responsible for managing the repositories of resources and experiences enabling ICTs' smart behavior and who should be in charge of maintaining the software.

During Session 1 and 2, participants suggested ICTs' management should be a school responsibility. For DT1S2, it is schools who set educational goals, they have access to children's data, they know what software they want to use, and so on. DT1S3 and DT2S3 agreed that schools have control over the information that is relevant for parents, like homework, grades. Further, schools know what privacy policies need to remain in place to avoid problems amongst parents.

Once again, when presented with this issue, DT1S4, whose members were all NGO staff, provided a radically different response than the ones other groups had provided.

*Why schools? Why would even schools want this type of responsibility? Schools do not have neither the time nor the staff to do this. For the Latin\* community schools are not even the most trusted spaces, so schools do not even have an adequate grasp of what the community looks like.*

In the same spirit of empowering the community, for this design team the answer was in the formation of alliances as ICTs managers: "It needs to be actually a consortium of

NGOs, with a committee of parents too, and maybe also members of the private sector.” They suggested exploring partnership with companies like Comcast, Microsoft, and Amazon, but as a group supporting NGOs work. Schools, as they put it, could be users of this type of technologies, sharing resources with the entire system, retrieving resources from there, and reading digest of the activities taking place in the system. From their perspective, however, school actors should not be in charge of administering it.

The idea of consortium-led techs in the educational system is quite different from the status quo [20, 21, 66]. Key concerns emerging from this radically different concept revolve around how to prevent larger actors from imposing their opinions over parents’. Further, there is a critical tension between the idea of de-centering schools as managers and the goal of some design teams—and parents—for learning about resources that better fit their children’s school-related activities.

#### 5.2.5 Discussion: A Call for Shifting Views on Parent-Education ICTs in the Educational System

This study reports on four assets-based PD sessions with institutional actors of the U.S. educational system. Participants’ designs were guided by S4’s results (See Section 5.1), including parents’ experiences, assets, and designs. In particular, design activities were motivated by four design questions that emerged from S4 as key to explore when seeking ways for the educational system to align with parents’ capacities. Although the design concepts that institutional actors proposed responded to these four different goals, they showed a high level of convergence in views of the educational system and goals for changing it. I now discuss the radical shift that these views and goals entail for the future of parent-education ICTs. I then present how these visions of the future shape concrete design pathways, and how institutional actors suggested deploying these pathways.

### *Rethinking The Role of Schools and Education in Parent-Education ICTs*

Across design sessions a key, constant tension in defining goals for the educational system was the different visions between school vs non-school actors. School actors tended to propose concepts and information flows that perpetuate what exists already, which include prioritizing the parent-teacher relationship and having ICTs respond to school-mandated privacy, and information demands. This dissertation's different studies suggest that, two fundamental reasons for this is that these actors have significant experience on 1) the relevance that school information has on children's everyday academic performance, and 2) the difficulties in trying to change schools' views and policies to adapt to minorities (See Chapter 4). Non-school actors, on the other hand, tended to recognize the many limitations that schools and teachers face to connect with parents and proposed initiatives to de-center schools as main actors in parent-education ICTs. They proposed to rather strengthening the meaning-making and emotional support that the community outside of schools can provide to parents, asking for a redefinition of what educational resources entail, challenging the notion that ICTs should serve schools and teachers as their target audience, and proposing to reconsider the assumption that schools should be in charge of the information that parents exchange. I discuss how these actors' views align with this dissertations' previous studies and what they entail for the traditional practices of the educational system.

**A Broader View of Educational Resources** Parent-education ICTs are traditionally media for schools to share school-based information (e.g., grades, homework, the educational apps that children need to use, school events) with parents [134, 135, 200]. Indeed, parents' designs in S4 suggest this information can be vital for parents to learn when to act for supporting their children (See Section 5.1). However, all previous studies have increasingly revealed that defining educational resources as school-related information only or mostly, can be counterproductive for immigrant parents' possibilities to participate in their children's education.

S1 highlighted that many parents need rather information about low-cost after-school options and classes (see Section 4.1). S2 specified that, for Latin\* parents, it is supporting organization the ones that can provide the out-of-school information that matter for these parents' context (see Section 4.2). S4 and the current study have further clarified that, in the case of immigrant parents, who are trying to adapt to a new context, educational resources are, in fact, all the resources that enable education, and not only resources that are evidently or directly related to education (see Section 5.1). That includes English classes for parents, leisure options for family time, free lunch options for the weekend, and so on. The design concepts that institutional actors proposed stress that it is not enough to share these resources to parents in context (S2) and to promote connections with more information sources that can diversify the resources being offered (S4). Going back to the idea of providing parents with immediate guidance about how to orchestrate educational resources, institutional actors highlighted that such immediate guidance needs to help parents to ground how this more broadly understood educational resources—and the institutions that provide them—connect back to their children's academic success.

The call for expanding the definition of educational resources, however, challenges existing views of parent-learning mediation, which focuses on ensuring children—and sometimes parents—attain direct learning outcomes [12, 128, 145]. As such, a broader view of educational resources indicates a strong demand for educational and technology researchers to provide a richer understanding of parents' situated learning experiences and how to help parents connect those with their children's educational needs.

**A Broader Understanding of The Audience and Goals of Parent-Education ICTs** Traditionally, parent-education ICTs work to mainly support the parent-teacher communication channel [20, 66]. Parent's designs, as described in S4, do stress a desire for that channel to be stronger and more reliable: it is teachers the ones parents want a close connection with the most. However, as S4 also showed, parents do recognize teachers are not

the most effective information source and many of their other designs stress a desire to connect with other parents who can offer them all kinds of information and emotional support (see Section 5.1). From there, S4 concluded that it is key to invest technological resources in fostering other channels and suggested that intelligent agents operating in parent-teacher channels could support that goal. Via in-time suggestions, these agents can expand parents' connections with other, also trustworthy information sources.

Using S4's pathway as a starting point, but also considering parents' capacities and designs as guidelines, non-school actors stressed the relevance for these information sources to have a direct connection with on-the-ground, community resources. The breath of the resources that this study's participants proposed aligns with the call for expanding the notion of educational resources. This includes the church, libraries, the playground, and even local business like Chickfill-A and Publix. This call for focusing on parents' connection with community resources is not one for disavowing teachers' relevance. Instead, it is a call for supporting parents in expanding their view of who can provide the information, emotional, and social support they need.

Finally, this study also called for ICTs to sometimes change the roles they assume in how information exchanges take place. In particular, the designs of institutional actors suggest that, when interacting with nondominant communities, sometimes teachers need to move from being information-givers to information-consumers. Specifically, designs suggest teachers as one of the institutional actors who need to receive information that can raise their awareness of how nondominant communities operate and how to better support them.

**A Community-based View of Administering Parent-Education ICTs** Across studies, I learned that a critical path for ensuring ICTs are proposed differently is by convincing and appealing to school districts. School districts' approval allow for vendors to enter schools and, from there reach critical mass. As a vendor enters the system, it increases the number

of services it can offer for the school to monitor its relationship with students and parents. This can go from content, to training for teachers, liaisons, and even parents. For parent-education ICTs vendors, thus, school districts and schools are their main clients. They design ICTs based on these institutions' requirements mostly, enabling school managers and teachers to have access to the collected information and decide how to use it for assessing parents' engagement to education [135, 289]. Parents, on the other hand, rarely have a role in deciding how their data is going to be used [21, 134].

This study showed that, for school actors this top-down model of ICT management is expected and, in a way, desirable. Schools have clear policies, both define by the district and local ones, that are easier to reinforce if ICTs respond to schools' rather than to parents' practices. In this study, however, non-school actors progressively challenged this traditional ICT production and management models. For them, it became clear that, to ensure that parent-education ICTs are and remain assets-based, these need to be managed by the community. Specifically, they advocated for parents, and not schools, to be the ones in charge of the resource-sharing, and meaning-making activities taking place in the community. Further, when thinking about developing and maintaining parent-education ICTs that attend to collaborative meaning-making across the community, non-school institutional actors advocated for multiple community stakeholders to lead the process. While this entails a complete departure from existing parent-education ICT models, it raises critical questions around how to handle issues of power differences amongst different community stakeholders. In particular, how to work with parents in learning the implications of data management practices, and how to empower them to face and challenge the interests of school actors and privacy software companies?

*Eyes on the Prize: The Goal is to Foster Relations in the Educational System, not To Technological Innovation*

Across studies, institutional actors expressed an ambiguous relationship with technological solutions: ICTs can create many problems for parents and institutional actors, but if used in ways that align with parents' practices, they could improve communication flows. During PD sessions, however, many actors expressed distrust towards the idea of introducing "yet another tool" in the educational system. Their discussions suggest a concern that pushing for ICTs to mediate family-education relations would not only be detrimental for parents, amplifying the problems that the system already has [5]. This study showed how institutional actors fear that ICTs introductions can make the entire system to further revolve around ICTs. Specifically, ICTs' failure can demand such level of community and institutional attention that it could further obscure possibilities to work towards attaining rather critical goals for the system.

Study 2 and 3 showed how the introduction of parent-education ICTs has created a series of demands for several system actors, including parents, liaisons, teachers, and even children (see Sections 4.2 and 4.3). In particular, ICTs have tended to transform and sometimes augment the information work needed in the system. For example, teachers and schools are expected to share information via emails, parents are expected to have an email account and check their emails constantly. As ICTs' presence increases in the system, parents are also expected to develop more sophisticated information-management practices, like keeping a digital calendar, setting up alarms for remember school events, finding, installing, and setting up educational resources, and so on. When parents fail to abide to those expectations, the system devotes efforts to attend that gap; school and NGO staff must then offer workshops and sessions for supporting parents in setting up email accounts, installing and learning how to use new ICTs, and constantly making personalized calls when parents do not answer their emails.

Via PD, this study offered participants a space to critically reflect on the role of ICTs



in the system, illuminating how the transformation of work that ICTs cause, tends to create a false idea of a problem and causes the system to continue directing all its resources to fix that problem. Specifically, this study shed light on how parent-education ICTs have instilled in the system the idea that the problem is that parents do not know how to handle technology and information. The solution, thus, is to fill in that gap through initiatives like investing efforts in teaching parents how to keep up and creating other ICTs that can work as patches to the problems created by other ICTs.

In proposing activities for participants to understand parents' assets and desire for stronger communities, this study's PD sessions helped participants to unearth the real problems in the system. It is not about helping parents access more information [3, 220] or designing techs that are easier from them to use [135], it is about supporting connections amongst the different members of the educational system. In particular, participants uncovered three critical problems to address for strengthening those connections: 1) raising awareness amongst all system actors about how non-dominant communities interact with the system; 2) motivating different institutions and organizations in the system to learn from each other; and 3) having system actors working with parents in becoming leaders of resource-sharing initiatives. From that realization, participants' call was to introduce ICTs as form of support for addressing those more ecological problems.

#### *Parent-Education ICTs As Incremental Assistants to Human Connections*

This dissertation was motivated by the idea that there is a need to introduce parent-education ICTs that would better respond to Latin\* parents' practices. This study helped reframe that notion of the problem that parents are facing and the design directions ICTs need to pursue. As mentioned in the previous discussion section, participants' designs and discussions clearly showed the dangers of introducing "yet another ICT" in to the system. Their proposal was not only to keep the "eyes on the prize", which is the strengthening of connections in the system. It was to also be really mindful in how ICTs are introduced,

keeping in mind two critical principles at all time: 1) technology needs to be an assistant for strengthening human practices and connections and never a replacement of these; and 2) introduce technology in increments, showing progressive improvements.

**Intelligent Agents as Assistants for Human Connections** This study explored with institutional actors the possibility of introducing an intelligent agent as a support for the parent-education relation. Intelligent agents have proven to be highly effective in diverse educational spaces [290, 291, 292, 293, 294]. However, participants' designs suggested that introducing this type of agent to parents with no previous steps and considerations could entail highly negative results; participants feared this agent could lead to the lost of human-to-human connections, an aspect they saw as critical for the system's operation. This study illuminated that the introduction of such a technology needs to contemplate mechanisms to ensure this agent operates as an assistant and not as a replacement for human connections. As such, participants strongly suggested that an intelligent agent could be more beneficial for institutional actors than for parents. It is institutional actors who need suggestions and resources for bettering their connections with parents and fostering parent-to-parent collaborations.

The introduction of conversational agents that directly interact with parents was also discussed. Across sessions, it was strongly emphasized that these agents should actively stay away from being an information provider and rather act as an assistant for the parent-system relationship. As such, these agents need to stress community-building mechanisms like supporting parent-to-parent remote collaboration and increasingly connecting parents with on-the-ground, community resources. For example, participants' designs proposed that the agent could operate in parallel with on-the-ground activities, suggesting these activities to parents and increasingly motivating parents to attend. By participating in on-the-ground activities, parents can better interact with each other, connect with other figures of authority, and exchange parenting experiences and resources.

In conclusion, although smart technologies have a lot of potential to support the educational system, future research needs to explore how to ensure it does not attempt to replace but amplify of human and community interactions.

**De Menos a Mas: Introducing ICTs in increments** As mentioned before, participants stressed the need for ICTs to support connections amongst institutional actors over supporting parents' connections with the system. However, acknowledging that technology's mediation in the parent-education relationship is unavoidable, they proposed that a critical aspect to consider when introducing ICTs is to do it in increments, ensuring that the meaning the ICT—or how it connects back to parents' everyday goals—is clear. For example, participants suggested to host meaning-making events on-the-ground to have parents share their experiences, and have a sense of how technology could fit in their goals. Then, without needing to register or to install anything, parents could incrementally receive more snippets of how the technological solution could support their everyday activities. The same principle of introducing tech via increments could apply to any task that an app proposes, like contributing to a digital content project, or collaborating with other parents in a particular information-sharing task.

Working in increments is essential to a view of technology as an assistant and not a replacement. It gives parents the opportunity to gradually become informed users of technology and know how it benefits their parental engagement practices.

#### *Design Pathways: An Institutional-informed Evolutions*

Study 4 suggested that framing the problem of Latin\* parents' misalignments with the educational system is not an information problem but a community-building one. Four design questions emerged from that study and guided the current inquiry with institutional actors. In four PD sessions, these actors identified connections amongst institutional actors, meaning-making support, and parent-to-parent closeness critical aspects for ICTs to

respond to the proposed questions. Iteratively, these actors proposed two feasible and desirable design pathways for parent-education ICTs in the educational system.

**A Chatbot For Connecting the Ecology** Session 1 explored a chatbot working in parent-teacher communication channels and drawing from a common repository of parents' experiences for recommending information sources to parents based on parents' contextual needs. The school role as a middle actor between parents and the chatbot, however, posed limitations to the type of information that the chatbot could deliver; different schools have different information dissemination policies. Design concepts in Session 2 challenged the role of ICTs as information providers only and explored initiatives where parents could engage with other parents and institutional actors in understanding how different resources relate to their everyday goals. In this session, participants saw technology as an assistant to on-the-ground activities, for getting parents' contact numbers or for showing parents the potential of some apps. Such an emphasis on close human-to-human connections rather than on information dissemination led to explore how the chatbot should serve, institutional actors or parents? Participants in Session 3 and Session 4 saw the benefit of chatbots serving both but in Session 4 they decided that the priority was to support institutional actors. If institutional actors know what is happening in the educational system, they can provide better close, information support to parents.

Figure 5.12 demonstrates how the chatbot could work in the educational system.

**Remote Volunteering Platform** In Session 1, design teams suggested to revamp volunteering by asking parents to participate in online activities where many are experts, such as putting together a cookbook, or translating a school document. For participants in Session 2, a key aspect of motivating parents' participation in organizations and schools has to do with the places where volunteering is promoted (e.g., the playground is better than schools). Session 3 agreed that the promotion of volunteering activities could be linked to different locations in the community and, contrary to Session 1's idea of digital volunteer-

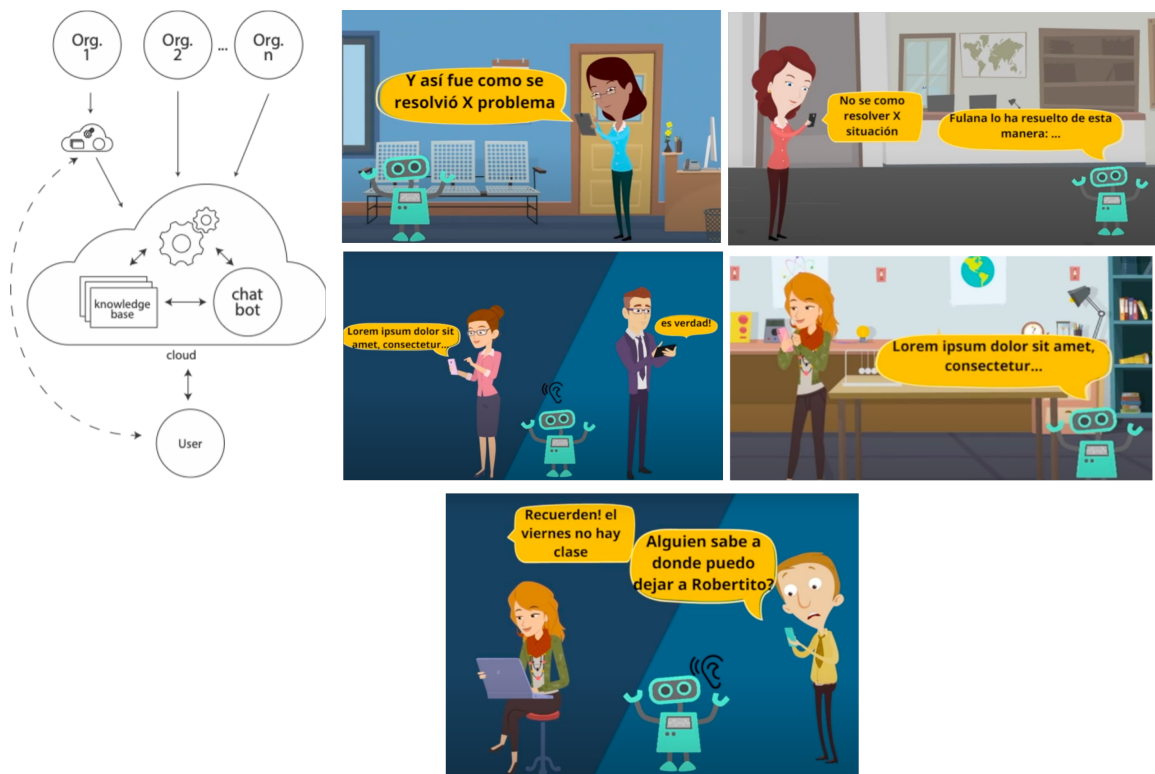


Figure 5.12: Demonstration of how the chatbot concept could interact with different actors in the educational system (e.g., learning information from actors and summarizing it for those who might value it depending on the context)

ing, this session saw potential on on-the-ground events' capacity to motivate face-to-face interactions. Session 4 resolved the digital vs on-the-ground problem by proposing to work on digital content but periodically organize rewarding events where parents could meet physically and engage in rich, face-to-face interactions. In Session 4, participants also emphasized that the volunteer app could easily work on the chatbot app, once it becomes available for parents. In particular, they saw in the common repository a way to minimize the risk for parents to reject participation. For example, the platform could ask parents for small bits of information (e.g., a name for a recipe, the name of doctor, the address of a particular place), store this in the repository, and put together an aggregate of several contributions related to a certain topic. The chatbot could then share this anonymous aggregate with other parents. Finally, Session 4 concluded that the responsibility of running this volunteering platform should eventually be of the parents; for them, the goal of parental participation should be supporting parents' self-organization.

Figure 5.13 demonstrates aspects of who this volunteering platform could work in the educational system.

### **5.3 Conclusion**

This chapter described the second phase of this dissertation. In engaging parents (S4) and institutional actors (S5) in different Assets-Based Participatory Design engagements, this phase demonstrated a first attempt for taking assets-based design pathways from the bottom-up, from communities to institutions. S4 illuminated the assets that parents identify as having and mobilizing on an everyday basis, and parents' views of future parent-education ICTs that leverage and support their assets. Using S4's findings as input and guidelines, S5 explored the support that different institutional actors, including school, NGO, and software company staff, could provide to parents' visions of the future.

These two PD experiences expand two contributions that Phase 1 had already offered to the body of work exploring parents' relationship with technologies for supporting their



Figure 5.13: Demonstration of how a micro-volunteering remote app could work for parents.

children's learning (See Chapter 4). *First*, it adds to the ecological view of Latin\* parents' information experiences by laying out parents' view of their capacities to negotiate information with figures of authority, self-empower via learning and serving, orchestrating their children's educational resources, and eliciting meaning-making via consejos. In addition, design activities shed light on how these capacities operate in relationship to the educational system.

*Second*, it offers a parent-based and institutionally-informed iteration on the design pathways for parent-education ICTs that Phase 1 had suggested. S4's findings suggest that parents' frame the gap between parents and the educational system as one of community-building rather than information poverty. These findings offered, thus, a novel perspective to the goals and particular mechanisms for supporting the four design pathways that Phase 1 had identified. S5's results specified these pathways even further by stressing connections amongst institutional actors and meaning-making support for institutional actors and parents as the main goals for any new parent-education ICT in the educational system. S4's and S5's design iterations resulted in two specific pathways for new parent-education ICTs:

- A smart, conversational agent that can work as an assistant for institutional actors, allowing them to share resources and experiences for motivating parents to participate in community-building activities. Once the agent has proven useful for institutional actors, it can become an assistant for parents as well, supporting them as they become more active in the community.
- A remote volunteering app that periodically invite partes to contribute to community-led digital content projects. As parents participate in a project, the app will increase the level of commitment it requires from them, gradually motivating them to collaborate with other parents and finally leading them to meet physically in community locations, and engage in rich, face-to-face interactions.

The findings of this phase's studies also revealed three critical, higher-level recom-



mendations for the design of parent-education ICTs to support assets-based changes in the educational system: 1) to rethink the role of schools and the definition of educational resources; 2) to avoid making ICTs the end goal of introducing ICTs; 3) and to ensure ICTs are introduced as an assistant to actors in the system rather than as a replacement to human connections.

Finally, Phase 2 expanded on Phase 1's methodological contributions to assets-based design, which I discuss in more detail in Chapter 6). In particular, it demonstrates how to use Anne Swidler's theory of culture in action as an analytical lens for understanding the relationship between assets and design goals [55]. It also contributes reflections on the particular challenges and methodological implications of facilitating assets-based participatory design engagements with vulnerable groups first, and institutional actors afterwards.

## CHAPTER 6

### ASSETS-BASED DESIGN: ANALYTICAL APPROACHES AND METHODOLOGICAL CONSIDERATIONS

#### 6.1 Introduction

As a promising approach for guiding sustainable technology-enhanced interventions in context where financial, emotional, and social resources are scarce, assets-based design is on the rise in the field of HCI [3, 7, 16, 17, 53, 70]. By proposing to prioritize the assets of vulnerable groups (e.g., existing knowledge, strengths, and capacities) rather than trying to fix their deficits, it offers to support communities in recovering their autonomy to pursue their own path towards sustained transformation [78, 171]. While designing from users' "haves" can promote agency, autonomy, and thereby realizing a sustained impact, incorporating assets in the design of technology-enhanced interventions is not simple [6, 7, 70]. It is unclear, for example, how to analyze the design potential of assets. Specifically, how to understand the relationship between assets in the wider environment and community-situated assets? In addition, the methodological considerations and design implications of working from assets with communities are still yet to be explored and discussed in the field.

In pursuing an assets-based approach to the design of parent-education ICTs for Latin\* immigrant parents, this dissertation contributes explorations towards those pending analytical and methodological questions. This chapter describes and discusses these contributions in detail. Specifically, it offers an overview of the general-to-particular, multi-perspective approach this dissertation used to analyzing assets in the educational system. Further, it highlights the methodological considerations and challenges that arose when facilitating assets-based PD from the bottom-up, and details critical strategies to navigate them.

The analytical and methodological lessons that this dissertation provides contribute to

the increasing interest of HCI researchers in understanding approaches for supporting vulnerable communities in attaining sustainable, emancipatory transformations [61, 71, 172, 295, 296]. These lessons illuminate with more precision the careful work needed to understand how assets in a large-scale system can relate to assets in communities, working together to support an ongoing design process that prioritizes strengths and possibilities over deficit-patching solutions. Drawing from these lessons, this chapter discusses the need for the field of HCI to explore more operationalizable definitions of assets that recognize their complexity as dynamic capacities not always suitable for particular goals in design. Further, it suggests that assets-based design entails a fundamental change of perspective of 1) what is needed to engage in design work; 2) what the role of technology should be in design; and 3) what counts as impact and change.

## **6.2 Analyzing Assets in a Large-Scale System: A General-to-Particular Approach**

Similar to many participatory approaches to change [73, 74, 180], much assets-based interventionist work within and outside the field have operated within the geographic boundaries of very particular communities [3, 15, 70]. There is much less work trying to understand the design potential of assets at a larger scale [6, 72], which is very much needed for informing technological interventions in public health and education. A critical aspect to expand on that particular work, however, is how to go beyond an analysis that represents a static map of assets operating in the system. That is, how to gather a complex yet operational view of systemic assets that can inform communities when analyzing the design potential of their assets.

The studies of this dissertation gradually explore that pending issue. Following [297] and their view of parental engagement as a relational phenomena between parents and multiple actors across systems, these demonstrate a multi-level, multi-perspective approach for analyzing assets, from the large-scale and thus, general, to the community-focused, and thus, particular. This approach enabled a rich recognition of the general tendencies across

systems, what works and how it can inform critical transformations for what does not work for parents and other actors, and then connect these insights back to how assets operate at the individual- and community-level.

Given that assets operate in terms of goals, and those are often individual, this dissertation adopted an approach that went from a general, not-goal oriented understanding of assets to progressively increasing exploring how goals determined assets' selection and use to define action. Such a view generated important opportunities to later unpack how an asset could be used to attain a particular goal for design.

The first three views of assets this dissertation undertook sought to clearly map the dynamic assets-based interactions taking place in the large-scale system. Having no clear individual goal for mobilizing assets, these views worked from a higher-level asset-goal perspective of individual's action. The first view, for example, assumed parenting as the main goal, and explored a large-scale understanding of the spaces that the system enables for parents to issue their voice and concerns, unpacking the level of freedom these spaces offer for all parents—regardless of their ethnicity—to mobilize their assets (Section 4.1). The next two views sought to further unpack the inner-workings of those spaces, specifically of the assets-based alignments (Section 4.2) and assets-based transformations (Section 4.3) that individuals pursued to create and maintain spaces for parents to access, make sense, and consume information. To that end, these two additional views assumed that individuals' use of assets always aimed at stabilizing the system's information flows.

With that general to more particular understanding of how assets operated in the the system, the final view this dissertation proposed was that of parents' assets—and goals for using them in the present and future—from their perspective (Section 5.1). As a whole, moving from the general to the particular illuminated how the assets that operate in a large-scale system relate, inform, and sometimes limit, the assets operating at a community-level.

Next, I describe this analytical approach in more detail and explain what each level and perspective of analysis contributed to the analysis of assets' design potential. Finally, I

discuss the relevance of a multi-perspective approach to understanding assets for embracing complexity in design and the need for ethnographic fieldwork for enabling an analysis of assets that illuminates how assets in a large-scale system might operate with those that stem from communities.

### 6.2.1 A Multi-Level, Multi-Perspective Analytical Approach to Assets

The goal of analyzing assets in the educational system was to illuminate possibilities for the system to support parents and to uncover when and where assets existed but were not necessarily working to facilitate parents' engagement practices. Although assets-based goals align well with PD commitments and methodological views, PD struggles to help in the unpacking of large-scale systems' complexity [187]. Thus, I chose to conduct qualitative interviews and ethnographic fieldwork as this dissertation first step. These methodological approaches can provide a holistic view of the different forms of being in the world and enable a reflection of what those differences entail for the operation of a system [187, 298]. This data offered three rich general-to-particular views of how actors in the system (parents and beyond) were mobilizing their assets as capacities to enhance information flows towards parents: a view of spaces, a view of relations, a view of transformations. With that understanding of the system, I then used PD to gather parents' situated understanding of their assets as cultural capacities. From that data, I analyzed how parents' capacities could operate with the different assets in the system. See Figure 6.1 for a visual representation of the different views that this study undertook to connect the individual, grounded experience of parents with their assets to the operation of assets in parents' broader context.

#### *An Assets-based Assessment of Spaces across a Large-Scale System*

Following [13] and their emphasis on the relational character of parental engagement, the first analysis of the data collected explored were the digital and non-digital spaces where parents interact to support their children. Specifically, it unpacked the opportunities that ex-

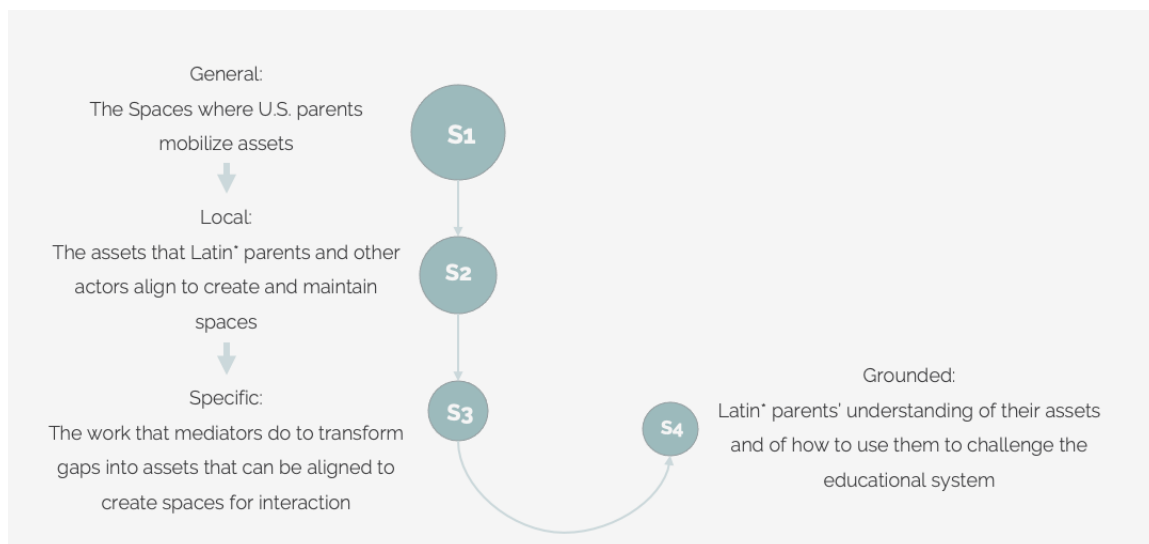


Figure 6.1: A Visual Representation of the Multi-Level, Multi-Perspective Analytical Approach to Assets, going from the General to the Grounded or Particular.

isting spaces offered different parents to mobilize their assets for supporting their children’s education

There are many reasons for initiating an assets-based analysis from this perspective. First, having no understanding of individuals’ particular assets and the goals they pursue, it was critical to start the analysis from a point where assets were being used and converged in the system. Digital and non-digital spaces for interaction were, thus, ideal to that end. In addition, although the U.S. is a very diverse country in terms of its school districts, the spaces they offer for parents to interact tend to be quite similar. Thus, looking at spaces from the perspective of different parents across the country offered an entry point into a system analysis that could generate highly-generalizable insights while still acknowledging different parents experience these spaces in different ways.

This view offered a general idea of all the spaces available to parents for mobilizing their assets in the educational system and the opportunities and challenges that exist for these to really supporting parents’ goals and actions. Further, it suggested the need for looking more in depth at how spaces are created, maintained, or hindered by different actors’ goals, actions, and use of their assets.

*Understanding Assets in Action across a Large-Scale System: Alignments and Transformations*

The understanding of spaces for all parents to act in the system—regardless of their ethnicity—opened up the opportunity to unpack the the assets and goals of the different individuals in the system that serves Latin\* parents specifically. In particular, by looking at spaces in more detail, it was feasible to understand the assets that individuals mobilize, and often align to create, maintain, or hinder them, and have a closer look at their possible goals in doing so. Looking at the actions leading to spaces for information exchange entailed attaining two additional views of how individuals where mobilizing their assets: their assets-alignment work for supporting effective spaces, and the particular work of transforming gaps and misalignments into temporary alignments.

**A View of Assets-Alignment Work in the System** In analyzing how actors align their assets to create, maintain, or hinder spaces, we can better understand how actors are willing to make their assets work together or not. Such an analysis of assets alignment and misalignment can, in turn, inform ideas of actions for effectively using assets in design. To analyze how individuals were aligning their assets or not, I drew inspiration from conceptual elements of ANT [299]. I leveraged its notion of relations—or alignments—as networks or associations of multiple human and non-human action as way to also explore the characteristics of technology that could be working as assets in the system. Further, I borrowed from its focus on how actors negotiate their interest for coming together as networks, to understand how individuals align their assets and form relations to support parents.

This analysis of assets in alignment—or not—shed light on: 1) the key actors that work with parents in the system, 2) the relations or networks that exist amongst them, 3) the assets that work together to craft relations that support parents, and 4) the possibilities for unstable relations to learn from those relations that are effective for parents. For example,

the this view of assets showed that parent-teacher relations were only fruitful for parents when teachers engaged in one-on-one negotiations with them. This is often not the case and thus, the analysis suggested that new parent-education ICTs could prompt teachers to engage in more personalized, context-rich interactions with parents.

**A View of Assets-Transformation Work in the System** The previous view of assets-alignment work shed light on the relevant role of mediators in a large-scale system such as the educational system. Those are actors whose specific work is to find ways to transform gaps into assets to create relations that would not exist otherwise or to fix unstable relations. In the case of the educational system, the previous view showed that these mediators are already acting as assets, building connections or relations to support parents. In analyzing their work, there was possibility of unpacking how the particular mechanisms they use to transform gaps into assets, and from there, illuminate further assets-based design possibilities.

To analyze mediators' work I drew on Vertesi's language of seams [191]. She proposed the metaphor of seams as an analytical tool that sheds light on people's ad-hoc efforts to align multiple, heterogeneous, physical and digital infrastructures (*e.g.*, *Facebook*, *Twitter*, *Phone 3G coverage*) for satisfying their information needs. The use of this language as an analytical lens was useful for illuminating two aspects of mediators work in terms of assets in the system. First, it shed light on all the spaces that mediators can create in transforming gaps into assets, from the most obvious to those often invisible to institutional decision-makers. It allowed to see how mediators are in permanent creation of patchworks that transform gaps into assets for supporting new services and that no service can ever be seamless for all the audiences they mediate. It also highlights the ways in which mediators' transformation work can be thwarted. For example, while many liaisons transformed gaps between *technology*, *information*, and *people*, not all of them could. Personal as well as institutional limitations (*e.g.*, schools efforts to strive for equity) prevented them from



engaging in many transformation and alignment activities. Such detailed understanding of transformation, alignment, and spaces, can, in turn, prompt a series of design directions hard to see otherwise (*e.g.*, finding ways for new technology to support liaisons' follow-up services, and designing for persuading institution decision-makers).

Second, this view and lens illuminated the potential in the gaps or seams in-between worlds to further support mediators' work. This perspective can provide a new way of looking at the social inequities acting as gaps between different actors. For example, liaisons leveraged immigrants' fear of deportation and the principal's authority, to bring two worlds together and help both groups understand emotional, contextual information about each other. Likewise, they leveraged their tacit authority as school staff and their own identity as Latino immigrants, for knowing how and when to switch tones that could facilitate information transfer. This raises an important question for HCI research with less dominant groups, which routinely grapples with inequities and differences: how can traits considered disadvantageous be mobilized to create rich moments of information-sharing that equally privileges highly unequal worlds?

#### *Assets at an Individual- and Community-level*

The rich view of spaces, alignments, and transformations around assets in the system was critical to envisioning feasible design pathways a large-scale system. However, it was extremely relevant to now connect that view of the system with individuals' and communities' situated view of their assets and practices in general. Thus, the last step was to analyze the data gathered during an assets-based PD engagement with parents (see Section 5.1). In this engagement, parents worked to identify their strengths and challenges in relation to the large-scale educational system, and then used those straights to envision new futures for parent-education ICTs. The analytical work done so far had complicated the view of assets as positive traits only (See Section 4.2 and 4.3). By analyzing them in the relation they enable in the educational system and in the actions that mediators take to align them,

this work had shown that assets are not predetermined traits; their use is dependent upon circumstances and the outcomes they produce after being used are not always positive or productive.

In analyzing parents' view of their assets, thus, it was critical to find a perspective that would draw attention to parents' agency and diversity of actions as they resist the inequities around them. Further, it was critical to analyze how assets' situated nature could impact design. That is, how to understand which asset can feasibly support what design purpose? For unpacking that relation, I used Anne Swidler's theory of culture-in-action as a productive assets-based analytical lens [55].

The theory of culture-in-action proposes that people get by in the world by using strategies of action, which are ensembles of the different cultural capacities they have developed overtime as they have interacted with culture at large and navigated everyday problems. In that sense, neither strategies nor capacities are productive or successful in essence; they are just part of people's everyday activities, often go unnoticed and unvalued. Although strategies are rather trivial, their analysis can help unpack not only the capacities that people use, but when, where, and why. As such, using culture-in-action as an analytical lens greatly enriched (either confirming or rectifying or adding), the results and design insights from the two previous analysis of assets.

For example, the culture-in-action analysis shed further light on the issue of parent-teacher relationship. It revealed that parents' practice of seeking a close relationship with teachers is one of their key parental engagement strategies, but one that is often ineffective for supporting their goals. Thus, it is far from productive. However, the analysis also shed that parents' goal behind using this capacity is to secure a connection with *a trusting figure of authority* they can negotiate actionable information about how to support their children. Further, parents' designs suggested that an intelligent agent in parent-teacher communication channels could support their specific goal, and thus, it is not critical to design for liaisons' intervention in the parent-teacher relation. The analysis highlighted, however,

that one of parents' critical goals is to foster a sense of empowerment via non-threatening spaces, and that they often leverage their capacities to serve others and self-learn via technological means for that goal. The design concept of a remote volunteering platform for liaisons to better connect parents with schools could work in this case. However, it would need to ask parents for their support rather than offering them help, demand very little commitment from them, and, present a very low risk for failing.

### 6.2.2 Discussion

#### *Analyzing Assets Beyond Productive Traits: Embracing Multiple Perspectives*

As an approach directly drawing from ABCD, much assets-based design work in HCI proposes to identify assets as static, productive traits and from there, find ways for technologies to support, leverage, or amplify such traits [3, 15, 16, 17]. The approach that this dissertation undertakes of analyzing assets form a large-scale, general view to a community-situated, particular one, complicates the idea of assets as static or even productive traits. By seeing assets in the educational system from four different perspectives, this dissertation sheds light on the complexities of how assets work and thus, of deriving design insights from them. In particular, it illuminated 1) the need for enriched, non-value-laden views of assets when working towards social change, and 2) the design potential of unpacking rather than seeking to leverage assets.

Through the analysis of assets in the system, this research championed a view of assets as action-based and oriented towards the creation of spaces for parents to support their children as a while. Overall, assets were never given a value of a positive/negative connotation but were used to describe the strategies that individuals hold to solve problems within a network of possibilities and limitations. It is precisely the emphasis on problem-solving, space-creating, relationship-building what gives this approach a rich analytical power; it drives us to ask a series of questions about actions a problem-solving tool. When looking at spaces of interaction in the system, for example, it prompted questions such as why is

this space working or not, what actions led to its creation, what problems is this space trying to solve, what assets does it entail or allow to be mobilized? What are the limitations it poses to assets or action? Such detailed dissection of assets in action allows us to identify a wide range of capacities, including those that individuals are not aware of. Further, we can see when these capacities are successfully performed as well as when they fail, thus achieving a holistic understanding that can inform responsible actions in design.

The traditional definition of strengths, knowledge, or assets in HCI as positive traits has pushed towards using assets in design around three types of actions only: *supporting*, *amplifying*, or *leveraging* assets. For example, in HCI, Cho et al. identified *comadrazgo* [close friendship amongst women] as an asset that Hispanic families use for information dissemination [3]. They then designed an SMS system that sends notifications to parents about informal learning opportunities and leverages *comadrazgo* to ensure information dissemination across families. By looking at assets in different ways but always with a view beyond positive traits, operating within a network of other capacities and structural limitations [263], this dissertation illuminates a broader range of roles for capacities in design.

In our analysis, for example, we saw that existing spaces did not allow for parents to mobilize their assets for engaging in closeness with teachers. Across studies, we learned how this asset is limited by a series of factors, including teachers' ability and willingness to invest time in fostering bi-cultural relationships. We also saw that there are other actors in the system that can engage in the needed closeness with parents but that parents often do not resort to these actors for multiple, systemic factors. Closeness, thus, becomes hard to leverage for design. The community-situated view of assets helped us to see, however, that a valid direction in this case would be to further *unpack* this capacity so as to unearth other capacities which uses might be more productive. the multi-perspective, general to particular view of assets, thus, illuminated that people can use seemingly negative responses, such as fear and distrust, as capacities. The design uses for these capacities would indeed deviate from traditional ones, depending on how and when people use them. For example,

if parents' fear is a response to protect their sense of self, design directions could explore other ways to build and protect their sense of self. If their distrust is to protect their families from being displaced, deported, or split apart, then we could look toward designs that build in security about their legal status in the U.S.

A multi-perspective, complex understanding of assets in a system, thus, offers a different view of what it entails to facilitate communities' empowerment. *First*, by diverging from only considering capacities that are productive and successful, it gives value to the everyday activities that the system and community members might have never considered useful or valuable otherwise (e.g., distrusting strangers). *Second*, it allows the community to consider many more design directions, thus augmenting its power to imagine feasible changes towards empowerment. This new view, I believe, is one that can lead to more, richer opportunities for empowerment.

### *The Relevance of Ethnography in the Analysis of Assets*

As an approach to design that draws from activist, participatory perspectives of change, such as ABCD, assets-based design can be perceived to be at odds with ethnographic fieldwork. For ethnography, change is not a priority or even a goal [298]. Rather, it emphasizes a commitment to describing current situations, which activists approaches see as a deterrent to innovation and a dismissal towards local expertise.

This dissertation demonstrates how ethnographic fieldwork is rather critical for grappling with complexity when analyzing assets during assets-based design. Ethnographic methods, with its goal of enriching holistic perspectives [187, 298], can illuminate how assets operate in large-scale systems across people, practices, artifacts, and communities. During Phase 1 of this dissertation, ethnographic fieldwork helped uncover the multiple spaces beyond homes and schools, where parents mobilize their assets to exchange information. This included parents' waiting time during children's catechism classes, events at public libraries, college fairs, WhatsApp groups with institutional staff, and Facebook

groups for learning how to use coupons. Moreover, fieldwork allowed me to learn about the many different actors that parents exchange information with and gather their use of assets as well. All of this was critical for informing different analytical perspectives of the assets in the educational system and how they might align to support parents.

Ethnographic fieldwork is also essential for supporting the analysis of how individuals' assets can inform goals for design. For example, S4 in Phase 2 of this dissertation, leveraged data from a one-month PD engagement with parents to offer a culture-in-action analysis of how parents' capacities can relate to particular goals for designing parent-education ICTs (See Section 5.1). While the data collected during the PD experience was highly relevant for the analysis, it was not enough for attaining a rich understanding the reasons behind parents' use of their capacities. The data gathered during a 2-year ethnographic fieldwork in the education system helped to fill in the gaps.

Ethnographic fieldwork is not frequently positioned as a pre-requisite for informing PD [298]. However, this dissertation demonstrates that for an assets-based design that goes from a large-scale to a participatory perspective, gathering ethnographic data is essential. It can highly enrich the possibilities for analyzing analyzing the behavior of assets and thus, the design potential in them.

### **6.3 Methodological Considerations and Challenges for an Assets-Based PD**

Although it is an emergent approach in HCI, assets-based design stems from long-standing participatory and emancipatory traditions in Community and Organizational Development, and Education [19, 48, 49, 171]. As such, facilitating an assets-based ICTs design endeavor implies a strong a commitment to working with communities in defining issues of concern, identifying assets, determining how to use those assets in a technology-enhanced intervention, and leading the steps towards those assets-based transformations [7, 17]. In the field of HCI, however, there are very few examples of how to go about that task [70]. Although existing community-based work in PD can guide such endeavors [167, 168, 300], the emphasis on positioning assets rather than needs at the center of the process can pose novel challenges for designers pursuing assets-based PD. Specifically, it can complicate decisions on what activities to foster, how to conduct them, and what outcomes to expect.

The second phase of this dissertation explores the methodological considerations of an assets-based PD facilitating two bottom-up, assets-based PD engagements for exploring the design of parent-education ICTs that can support Latin\* parents in the U.S. educational system. Drawing inspiration from many other participatory approaches to research and design, these engagements led participants through a critical consciousness process [179, 264, 301] for unveiling how their assets operate with regards to larger systems and envisioning how to use their assets to transform their realities. The first engagement worked critical consciousness with low-income Latin\* immigrant parents (see Section 5.1), who identified their assets and devised desirable assets-based futures. The second, used parents' insights to work a critical consciousness with institutional actors (see Section 5.1), who revised their long-standing perspectives of parents' capacities and envisioned ways for them to support parents' assets-based aspirations.

In this chapter, I reflect on the methodological decisions I made to facilitate PD as process where participants appreciate and relate to assets, critique them, and explore how to

design with them in mind. In particular, I describe how these decisions pose critical challenges for participants, who struggle to trust a process that asks them to move away from traditional deficit-based views, and then pushed them to look critically at themselves, their technological ambitions, and their surroundings. Further, I explain the design resources that helped me through this process. Finally, I discuss three methodological commitments that my experience suggests are critical for other researchers and designers to consider when pursuing assets-based design. First, committing to constantly engaging in work before the work of design. Second, detaching from the idea that technology is the inevitable purpose of design. Third, embracing the value of incremental micro-changes as relevant steps towards social transformation.

### 6.3.1 Assets-Based PD With Vulnerable Groups

In pursuing an assets-based approach to design, it was critical to engage in assets-based PD with parents. After learning about the assets in the system and deriving assets-based design insights from this formative work, it was critical to return this understanding back to parents. Specifically, it was essential for parents to engage in making sense of their assets—and their potential to inform design—as they operate with the actors, assets and limitations in the system. The 2-year ethnographic work suggested three critical factors to consider when engaging in an assets-based process with parents. First, parents' tendency to focus on their deficits without recognizing their assets. Second, parents' complex power-based relationship with technology, which lead them to sometimes adopt it blindly as inherently productive and sometimes reject it right away. Third, the critical differences in the availability of supporting resources across the areas where parents live.

To address these aspects, I organized workshops activities so that they would walk participants through an assets-based “path of expression” [275]. That is, a path that would specifically allow parents to 1) appreciate their assets, 2) critically analyze their assets as they operate in relation to the larger system, including technology, and 3) use their assets



to imagine desirable, empowering futures.

The original plan was to work this path with a group of 4 smaller groups of 3 to 5 parents located across the city of Atlanta. Community partners suggested that working across multiple locations was critical to gather parents' different experiences with assets and systems. However, due to a CP's request, I also worked with a group of 25 parents, offering them an assets-based PD-style workshop for learning about technologies and parenting. The technology-centered aspect of this workshop helped at gathering parents' insights on how ICTs can work together with and amplify parents' assets. The learning component of this workshop changed the sequence of events in the proposed path but the components remained the same.

Navigating an assets-based path of expression with parents, however, entailed three critical challenges. *First*, it was a struggle to foster participants' trust in a process that demanded them to see not only their strengths but their many challenges and when their strengths did not work. *Second*, given parents' complex experience with technology, a constant question for this process was, when to introduce it and how? *Finally*, keeping reflections and discussions always around assets rather than deficits demanded constant attention to a series of details and activities. I now share reflections on these challenges and the design resources I used to navigate them.

### *Trusting an Assets-Based Process*

Ethnographic fieldwork indicated that many immigrant parents are not used of thinking what they have; the systems around them and their differences from mainstream practices drives them to rather feed a deficit-based self-image [204]. Proposing them to change this discourse can lead to discomfort. Further, proposing to analyze how what they have and do is a strength but might actually not be working as such, can be emotionally demanding. All of these, in general, can lead to a sense of distrust towards the process, which in turn, can hinder participation.

As previous work in participatory design and action research suggest, working towards participants' trust entails constant reflection on how to meet participants where they are [74, 302, 303]. For this particular endeavor, this entailed paying close attention to details such as offering adequate support for participants' different literacy levels, asking them to negotiate the digital and physical resources they want to use for participating (e.g, including meeting spaces, coffee breaks), and providing scaffolds for helping participants to overcome fear of sharing their experiences (e.g., sample of finalized activities). In the particular case of fostering trust in assets-based PD, however, there are two strategies I found essential. *First*, to offer parents enough opportunities for them to gradually explore different views of their assets and their challenges. For example, I offered parents a diversity of activities, affording each a different view of their assets. Some activities supported participants to discover their assets by remembering a challenging moment. Others enabled participants to identify the resources they use to solve a parenting problem, and from there, asked them to analyze the effectiveness of those resources. These constant perspective-shifting sought to help parents to gain incremental knowledge about the complexity of their assets: when those failed, when those succeeded, and why.

*Second*, to ensure that the material resources provided per activity speak to parents' experiences mobilizing their strengths. The materiality of participatory activities is critical for motivating participation [302, 304, 305]. Using materiality that says nothing to participants or conveys the wrong message can lead to participants' rejection of the activity [71]. I specifically leveraged observations from my previous ethnographic engagement to offer parents materials that would give them a range of starting points to re-discover their assets. For example, in working towards supporting parents' appreciation of their assets, I asked participants to represent a parenting challenge using a visual roadmap and a range of sticker options for adding detail to it. These included stickers of people, organizations, and artifacts that her prior work had shown as frequently present in parents' lives (e.g., bilingual school staff, doctors, co-workers, extended family, and technologies like WhatsApp,

Facebook). For parents like Jovita, these resources helped her gain the trust she needed to explore the complicated relationship between her parenting abilities and the systems surrounding her.

*Right away, I knew something was not quite right with Pablo. A mother always knows. My journey has been one of insistence and perseverance. First, I insisted with the pediatrician and then with the school to evaluate my child and give him the support he needs. Before that, I really avoided going to school, but now I'm always there. I still don't have the answer I need, but I am not giving up. One thing that has helped me a lot is listening to other parents' advice on more strategies to push the school to do something.*

#### *Fostering a Balance Between Technology and Assets*

The presence of technology during an assets-based PD endeavor is highly relevant. The entire engagement is precisely pursuing insights for technology design. During ethnographic fieldwork, however, it was apparent that the complex relationship that parents have with technology could interfere with their ability to appreciate their assets. Some parents reject school's imposition of technology by simply not using it but are prompt to embrace and become experts in using many other everyday apps such as Facebook. Despite their expertise, they are quick to deem their lack of familiarity with computers as a deficiency. Blindly introducing technology during assets-based PD, thus, can take over activities (e.g., parents could overfocus on its features, learning how to use it, or they can fear it and reject it), obscuring the analysis of assets. A critical challenge for the PD workshops I facilitated, thus, was how to keep a balance between technological ambitions and developing a critical understanding of assets?

I resorted to three strategies to handle this problem. *First*, I planned activities so that technology's role in participants' lives would emerge progressively, without positioning it at the center of the process. For example, initial activities in Group A constantly included

materials like stickers with both technological (e.g., a PC, email icon, WhatsApp icon) and non-technological resources (e.g., a church building), leaving it to participants to decide. Although Group B's goal was to specifically learn how to use technology, I planned the workshop sessions so that knowledge of assets would emerge before knowledge of technology. When learning about parental control apps, we first went over their fears and aspirations for their children's technology use, even using pictures to craft a paper add for convincing their children to follow technology use rules at home. Only then, we went into advantages and disadvantages of using parental control apps.

Second, as technology progressively emerged in our discussions, I included activities that would help participants to bring together the different pieces of knowledge about their assets, and from there, to critically analyze how certain technologies support or hinder their assets. After technology organically emerged during the photo diary activity, I used my notes, and all the content parents had created during the previous session to generate a booklet with participants' photos and word clouds aggregating participants' assets and challenges. During the next colocated session, I distributed these booklets to all participants and we discussed the world clouds and the content of the pictures in relationship to the words in the cloud. Seeing technologies like YouTube, television, Duolingo, and Facebook together with assets such as perseverance and family, and learning how some participants had answered with pictures of technologies (e.g., using YouTube to learn English while doing house chores, watching television to stay informed), prompted participants to discuss their technology use in relation to their assets, challenges, and goals. For example, Diana, a participant, told us how she does not like to use Facebook for gossiping but really likes to use it to follow self-improvement groups, which had been very helpful for her to cope with her immigration experience.

Finally, even if technology was not present during a design exercise, I tried to bring technological elements into the design space. For example, during the final assets-based design activity with Group A, it was critical to avoid forcing technology as a protagonist in

the process. Positing magical powers for everyday objects as the end product of this future-envisioning activity helped. Magic can support speculation unbounded by socio-cultural or technological barriers, and thus, leave leeway for participants to center on a critical use of their capacities over aiming at technological innovation. However, it was as important to be eventually able to derive insights from those magical objects to inform technology design. Thus, in providing objects to participants, I chose those who could represent input and output media similar to the ones that technology provides (e.g., a magnifying glass for searching finding, a flute to represent sound). At the end of the session, we also discussed the possibilities for some of participants' design decisions to inform novel parent-education ICTs.

### *Staying With The Assets*

Another ever-present challenge was to manage the risk that participants would return to analyzing their challenges from a deficit-based perspective only. In general, staying with the assets when trying to understand a problem can be extremely difficult, it requires to get rid of old-established patterns of understanding the world. Deficits are a reality and are undeniable. However, using only deficits to understand a problem is a half-told story.

To support parents in understanding the whole story of their individual and collective challenges, I resorted to two strategies. *First*, to constantly foster activities that enable participants to juxtapose their assets and challenges with others and from there to explore how assets work, situatedly. For Group B, this took place during group work trying to craft the ad for convincing children to follow rules at home, or deciding the topic and rules for creating an online community, and then discussing their experience with there rest. For Group A, the experience-sharing and collective analysis of assets took place all along in the process. For example, from the beginning, parents created a board of posit notes with assets and challenges based on participants' individual presentations of their experiences and challenges. Later on, they discussed the content of the booklet with word

clouds and photos from the diary experience. Finally, they collaborated in creating a board of information sources ordered in terms of preference and rated in terms of efficiency. The result, as this conversation between two participants shows, was a constant unveiling of their different realities, which entails a complex mix of assets and challenges.

*Carmen: It is very hard to find other moms to talk with. Many moms are not that present because they do not have a place to leave their children and they also have a lot of work to do Ana: Yes, true, but others who can come, don't because in general they feel that coming will make no difference for them. They just don't see how being here can help them and their families, so they rather go to Zumba class than to come to school meetings. Me: Are there any particular circumstances where they are more connected with schools?" Carmen: Yes! Mainly when we have to organize parties at school, then a lot of moms become interested Ana: Yes, many are eager to help. There was this mom who kept asking me to bring a dish to the event and she was really enthusiastic about sharing with me the best places to buy ingredients for that dish.*

A second strategy that was critical to keep assets as part of the design component of the workshop, was to put distance between participants and the problem, and then give parents familiar tools that will amplify their opportunity to address the problem via assets. In Group A, I used Fictional Inquiry [306] as an ally for that purpose: by positioning participants in fictional narratives, they can take distance from the problem. Further, the fictional aspect can give participants more power to act, encouraging them to take a glimpse of what could be possible. To keep parents comfortable and engaged during the process, however, the narrative had to be familiar enough. I used one of the most beloved cultural pieces of all Latin American countries [278, 307], which elicited in participants a feeling of home. Further, I put the show characters in contexts familiar to participants: immigration, parenting, and schooling. Parents' received a request to help the character in need by assigning magic powers to a set of objects, turning them into solutions for parenting problems. In situating

participants as experts with magical powers rather than as beings with lacks and problems, this narrative supported participants in staying with the assets. For example, recognizing parents' desire to share their knowledge as a critical asset, Luisa proposed a magical magnifying glass for expanding parents' chances to help each other (Fig. ??b). Her design suggested the need to revise schools' privacy policies constraining parents' desire to build a trusting community.

*If “Don Ramon” uses the magnifying glass to read the email that the teacher sends to all parents, he will be able to see a mark on the email address of parents who have the same concerns he has. The fact that the email is coming from the teacher, who is a form of authority, can help “Don Ramon” feel safer in contacting these other parents.*

### 6.3.2 Assets-Based PD With Institutional Actors

The idea of facilitating a PD engagement with institutional actors as a next step stemmed from a two-fold goal. First, to explore feasible forms of outside-community support for parents ideas to move bottom-up. Second, to motivate institutional actors in reflecting about how parents' assets-based goals could change their practice. The previous 2-year ethnographic fieldwork suggested that a critical challenge for this PD endeavor would entail helping institutional actors in changing their mindset about parents. The close interactions that many institutional actors had with parents' everyday struggles had led institutional actors to hold a strong deficit-based discourse.

This endeavor, thus, had to foster a critical consciousness process for institutional actors not to realize their assets but to appreciate and relate with parents' assets and visions of the future. With this methodological goal in mind, I planned PD sessions around three goals. First, to allow participants to connect with the idea that everybody has assets to get by in the world. Second, to bring parents' assets and visions to the forefront of the design process. Third, to give participants enough time to process and discuss the changes that their designs

entail for their practice and the operation of the educational system.

It is relevant to mention that, ideally, it should be parents facilitating these goals. As Freire explains, those oppressed need to be always directly and intimately involved at each stage of their liberation [199]. However, working with parents in getting to the state where they would feel comfortable facilitating a PD workshop with institutional actors would take much longer. As parents' assets-based ideas for the future emerged in Section 5.1, I deemed convenient to gather the impression of institutional actors about what structures of power would need to be further challenged and how.

I worked the aforementioned goals in four sessions with four different groups of institutional actors. Each new workshop iterated on the results of previous ones, however, each session pursued the core goals mentioned before. I now reflect on the challenges I faced in the pursuit of such goals across different sessions, highlighting the design resources that were useful for navigating them.

### *Relate*

As mentioned before, visualizing parents from an assets-based perspective entailed a struggle for many institutional actors. Thus, it became critical for working with them to first help them relate to this new way of thinking. Two strategies were critical for doing so.

First, it is critical to for assets-relating activities to help participants to focus on the assets of the most vulnerable group. In seeking to introduce the idea of assets to participants, Session 1 proposed them an activity for sharing the challenges of their practice and how they had navigated them. At the end, I presented participants with some examples of parents' assets to help them relate to this new perspective. Although the idea of working from parents' assets impacted some participants, it failed to do so for many others. Up until the end, many continued struggling to bring parents' assets into design activities. In Session 2, I decided to change the approach and begin the session by distributing short narratives of parents' realities that showed parents having problems but also assets to navigate them.



Participants were much more engaged with understanding these realities, asking questions and discussing the systemic reasons behind parents' problems.

Second, assets-relating activities need to engage participants in seeing themselves and their assets in relation to the reality and assets of vulnerable groups. The activity in Session 1 relied on my presentation of parents' assets to help participants relate to assets perspectives. As such, it did not really support participants in constructing the knowledge they needed for engaging in assets-based design. In contrast, the narratives of parents' experiences that I shared with participants included questions to help them connect their reality with parents'. For example, participants had to reflect on the difference between the assets they would use to face the same challenges that parents were facing and the assets that parents could feasibly use. This activity motivated participants to discuss the complex systemic reasons behind these differences.

#### *Highlighting Assets in the Presentation of Findings and Design Insights*

A critical challenge for the sessions of this PD engagement was grappling with the large amount of findings about how parents interact with the educational system and the assets-based design insights preceding each session. It was relevant for institutional actors to grapple with this knowledge so as to inform their design decisions. However, highlighting how assets were shaping the system, parents' interactions, and design insights, needed particular information-organizing strategies.

One of the key strategies I used across sessions was to rely on narration styles to present findings. Narratives can be powerful tools for conveying complexity, which is a critical quality of how assets and limitations interact in the educational system [304, 305]. For the first two sessions, a cheat sheet describing a design insight, narrating the findings that support it, and suggesting design opportunities was of help. As sessions progressed and narrowed down design concepts, I resorted to visual representations of concepts such as animated videos, to convey the needed narrative of assets and limitations supporting the

design designs behind the concept. To leave certain aspects of the concepts unanswered and pose specific design questions at the end helped to inform session participants where to focus during their design activities.

### *Designing With Assets*

For this assets-based PD engagement, helping institutional actors to iterate on design concepts while leveraging the assets in the system and prioritizing parents' assets and vision for the future, was its main goal. However, doing so was quite challenging. There is an abundance of assets in the system that can support parents, parents' themselves also have many assets, and their visions for the future entail many different insights. I kept iterating on two different strategies to support participants in designing with assets in mind.

The first strategy entails to provide a constrained number of visual representations of existing assets. In my case, I created cards visually representing assets with text behind explaining how these assets operate in the system. In Session 1 I distributed them all to each group. Groups did use them in interesting ways during their design process. For example, a group used the different parents' profile to represent how their design could leverage them for enhancing information transfer. However, there were way too many assets for participants to notice or make sense of. In Session 2, I corrected that problem, providing groups with boxes of assets distributed in technological, human, and infrastructural and asking participants to draw only three cards from each box. As a result, participants were able to think of possibilities outside of what already exists, exploring creative and yet still feasible ways to leverage the assets. One group, for example, had to use a card representing a playground in their design, and another had to use a television and a newspaper.

The second strategy I used was to throw assets-based curveballs during the design process. These curveballs, which entailed elements such as parents' designs and fictional use scenarios, helped participants to get back to the goal of uplifting assets. In Session 2, for example, once groups had produced design concepts, I offered them narratives of parents'

designs, explaining the assets these designs entailed and the goals they were pursuing. Having those designs at hand helped participants to confirm their design direction or change it entirely. In the case of one Session 2 groups, they explained “We got the design where a parent used head antennas to get help from other parents, and it helped us realize that our needed to stress offering very simple, very direct support, to be straightforward.”

### 6.3.3 Discussion

Emerging work in HCI proposes assets-based design as a fundamental shift away from design approaches that frame intersecting complexities as problems of lacks and lagging behind and technology as the fix for them [3, 7, 16, 17, 53, 70]. Rather than a shift, in this dissertation, I have explored assets-based design as an emphasis on commitments already proposed and established by participatory approaches to design and research [73, 74, 179, 180, 300]. In particular, I have pursued it as a call for methodological decisions that constantly prioritize the analysis of and support for participants’ relationship with existing knowledge, resources, skills, and strengths as the fundamental route towards social transformations.

As seen in this section, working on such a commitment towards assets during PD engagements, however, poses particular methodological challenges to designers. It demand designers to constantly work to foster participants’ trust in a process that challenges their traditional deficit-based way of thinking. Further, it demands for reflection and design methods to include elements that allow participants to return to appreciating and considering—their or other actors’—assets in relation to existing challenges. As a whole, the constant push towards appreciating assets forces designers and participants to rethink how technology fits in design and in participants’ everyday lives.

In this section, I described how I resorted to design resources like a careful selection of materials, constantly motivating participants to contrast their experiences, and presenting them with fictional as well as real narratives, to navigate these issues. I now discuss two

implications that designers need to consider for being ready to handle the arising challenges of assets-based PD: (1) committing to constantly engaging in work before *the* work of design, and (2) reconsidering technology as the inevitable purpose of design. Finally, I reflect on participants' navigation through the challenges of assets-based design entails micro but critical actions towards social transformation. Specifically, I call for HCI researchers and designers to embrace the value of such actions in their work and narratives about successful interventions in the field.

### *The Work Before The Work of Assets-Based PD*

As Harrington et al. [71] posit, crafting PD sessions for supporting community-based transformation cannot operate in a vacuum. The work of design needs much previous work [308, 309] that, while essential, often remains invisible and unappreciated [310, 311]. Assets-based PD is not the exception in this case. However, the reflections on my process suggest that, by motivating a collective to become critical about their assets, assets-based PD can better illuminate the work before work that is needed. Specifically, my practice suggest this work needs to take place at systemic, community and design levels.

In my practice, it was clear the relevance of constantly offering participants resources that represent elements in the system. In the case of parents, offering these elements allowed them to contrast how their different experiences with the educational system had shaped their assets and impose limitations in using them. In the case of institutional actors, having these elements helped them envision possible ways for using assets in design. To be able to offer these systemic elements, however, designers need to know the system themselves. Specifically, they need to have a rich understanding of how systemic actors (e.g., large institutions, cultural norms, and so on) interact with each other, promoting or limiting others to mobilize their assets. In my case, the 2-year ethnographic fieldwork I conducted previous to PD enabled me to decide what elements of the system to present to parents, and how to do it in ways that can inform participants' analysis of their reality without imposing

my own view.

The reflections on my experience working with parents and institutional actors highlight the relevance of fostering participants' trust in an assets-based process. Participants need constant support to keep thinking about their assets and challenges without falling into explaining all challenges due to their own deficits or the deficits of others. Fostering trust requires is an ever-present community-level work that needs to take place before and after, inside and outside design sessions [162, 163]. In my case, such community work entailed constantly engaging with the community so as to learn about what spaces and people participants trust, their cultural practices and the cultural resources they often resort to, including the media they consume, the food they prefer for coffee-breaks, the childcare provider they trust, and so on. The closeness of my constant relationship with community actors allowed me to make critical decisions that would help participants feel more in control and thus, engage in highly-personal reflections on their everyday assets and challenges. For example, in choosing the school as the design sessions' location I enabled parents to take ownership of it, bring food on their own, and exchange information that was meaningful to them. In the case of the PD workshops with institutional actors, it was due to my existing relationship with them and my existing efforts to report findings to them, that they were able to trust the process I proposed to them. It becomes vital for designers, then, to continuously work towards transferring that sense of control and assets-based dialogues from participants' spaces to the design session.

Finally, all designers must constantly engage design-level work when moving from one design session to another. As any practitioner, they have to engage on reflection-in and on-action to understand how to improve their practice for a next iteration. [199, 312]. The reflections on the assets-based PD engagement I facilitated suggest that when working in envisioning assets-based technologies, the emphasis on this type design-level work needs to lie on discussing and devising how to uplift assets over technological fixes. Further, it needs to inform participants' critical views of the relationship between assets and

technological introductions. In my work with parents, for example, the sessions previous to the design of ICTs suggested that by focusing on a direct design of technological artifacts, parents would lose focus of their assets. As a result, I proposed them an activity to rather create highly-speculative concepts with no explicit technology component. In the case of institutional actors, each session informed the next, and allowed me to realize the relevance of introducing the narratives of parents' designs as a resource for participants to balance technological ambitions with the potential of parents' assets.

### *The Role of Technology in an Assets-Based Journey*

This dissertation suggests assets-based design work, with its emphasis on assets' growth, complicates the understanding of how to foster high technological ambitions. Specifically, my reflections suggest that when prioritizing assets, it is critical to rethink how to promote technologies during PD engagements; they need to be present but cannot be the start and end point of the endeavor. That is, technology cannot be the goal for that can erase participants' understanding of—their or others'—existing strengths and aspirations. Drawing on the methodological challenges I presented, I suggest three critical ways in which an assets-based design changes the role of technology during PD. *First*, to ensure any introduction of new technologies leverage participants' assets. *Second*, to facilitate participants' critical consciousness on how technology relates to their assets. *Third*, determining the value of technology as support for the future based on how it supports the growth of participants' assets.

Introducing new technologies to vulnerable groups can amplify inequities, especially if it is done outside of participants' zone of comfort [5]. A critical awareness of assets can help participants see themselves as decision-makers in control of their reality [199]. Thus, my reflections highlight I introduced new technologies only when participants had engaged in such awareness and could leverage it for feeling in control of the novel introduction (e.g., in Group B I only introduced parental control apps after the parents had reflected on their

assets for managing a safe use of technology at home).

In addition, in my experience, it was key for the introduction of new technologies to pursue goals beyond skill-development and into being a means to facilitate reflection and action about how these technologies relate to participants' assets. In our case, Lucinda's tech workshop with Group B did not focus on teaching participants how to become technology users, but rather to ensure participants could reflect on how these novel technologies might amplify what they already have.

Finally, to work towards high technological ambitions through assets-based design entails working with participants to determine the value of new technologies in terms of how these technologies can grow their assets. Each technology-related activity, thus, must position technology as a means to understand possible assets-based futures rather than as an invariable destination. This, in turn, can help participants to incrementally grow agency and develop a critical consciousness of what technology can and cannot do towards their desired future. For example, the design activity where parents created speculative designs allowed them to reflect on how community-building is one of their strongest assets but a hard one to secure.

These three new ways of understanding technology during assets-based design PD highlight technology as a form of support to existing human capacity. As such, they allow designers to constantly honor a commitment to engaging in design as an ongoing process of action and reflection towards the collective's growth. In doing so, the design process gives control back to the collective so that they can define their transformation in their own terms based on their understanding of their assets and their vision of the future.

### *The Value of Increments in Sustained Transformation*

Although the field of HCI is increasingly working to challenge normative views of technology, impact, and productivity [61, 71, 74, 168, 300, 303, 313], for the most part, it still promotes an emphasis on stories of success, where the impact of an intervention is visible

and measurable [5, 76, 314]. The methodological considerations and challenges that I described in this section highlight assets-based design of technologies is at odds with these traditional views of action and impact. The work needed before and during the work of design, which entails to understand the system, to gain communities' trust, and to work with them in envisioning pathways for the future where they respect, leverage, and amplify their assets entails a slow processes that require considerable time and effort. As a result, the research and design endeavor that this dissertation demonstrates has not produced the measurable impact that HCI is looking for.

This is not to say that an assets-based design approach, such as the one I undertook in this dissertation, does not lead to change. Across my work I have indeed witnessed how assets-based PD engagements have fostered a variety of changes in participants' lives. These have included changes in their attitudes towards their assets and the assets of others, growth in their knowledge about their capacities in relationship with technology, broadening of their social connections with other community members, and the acquisition of new working practices for supporting parents. In the case of the software company I worked with, assets-based PD led them to reconsider their products' goal and discuss how they can make changes to the way they motivate parents to use their product. While these changes may not seem like much especially considering the broader societal engagement that assets-based design sets itself to do, they all add small takes in the transformation that can snowball into a larger impact. In particular, these changes are evidence that the assets-based design process allowed participants to see their reality in a different light, no longer as a static reality "but as a reality in process, in transformation" [264, pp. 83 ].

Based on this experience, I argue for HCI researchers and designers to rethink how they pursue and report on impact and productivity. Specifically, I make a call for more spaces for the field to foster and inform the incremental transformations of assets-based work. Embracing the incremental and slow nature of assets-based design can shed light on pathways towards sustained impact. Drastic moves may place the activity beyond the reach of the



participants. At best, the participants will not be able to leverage their existing strengths to participate in the activity and may have to depend on external others to complete it. At worst, the drastic move may place the participants at a position of discomfort that not only hinders reflection and action at that moment but may erode their trust over the process and the designer. In contrast, working within incremental changes can enable participants to buy-in to the idea and more crucially, decide on whether and how they want to continue in the ongoing journey for transformation.

This is not to say that design should overlook the urgent needs or problems present in the community and postpone acting to address them. Problems are the realities of the ground and stem from the larger systems in which the community is situated. However, I argue that throwing technological solutions at these problems without fully understanding them can deeply worsen them. Although assets-based design might not produce immediate solutions, it can offer incremental outcomes that can have a long-term impact on participants' lives. Further, those incremental outcomes can enrich how the community understands the problems that surround them and help them contest them in more sustainable ways.

## **6.4 Conclusion**

The field of HCI is showing an increasing interest in an assets-based approach to design[3, 7, 16, 17, 53, 70]. However, such an approach entails diverse analytical and methodological challenges. This chapter describes how this dissertation's work on an assets-based design approach to revise the design of parent-education ICTs with(in) the educational system, advances pending questions on the topic.

Analytically, this dissertation demonstrates a general-to-particular, multi-perspective approach for understanding how the assets of community members relate to—that is, inform, confirm, correct, or expand—those assets operating at a large-scale system. In doing so, it sheds light on the need for designers working assets-based approaches to explore more operationalizable definitions of assets that recognize their complexity as dynamic

capacities that may not always serve particular goals for design.

Methodologically, this dissertation contributes critical considerations for organizing the activities of assets-based PD endeavors that seek to attain a bottom-up impact, working with vulnerable groups first, and transferring those insights to institutional actors later. In particular, it demonstrates the challenges these endeavors pose for designers and the design strategies that are useful for navigating such challenges.

The analytical and methodological lessons that this dissertation provides contribute to the increasing interest of HCI researchers in understanding approaches for supporting vulnerable communities in attaining sustainable, emancipatory transformations [61, 71, 172, 295, 296]. In particular, they illuminate the need for the field of HCI to explore operationalizable definitions of assets that recognize their complexity as dynamic capacities that may not always serve particular goals for design. Further, they provide designers with three critical aspects to (re)consider before undertaking an assets-based design project: acknowledging the significant research and design effort needed in planning and executing the work before the work of design, seeing technology as an intermediary facilitating the ongoing journey, and embracing slow incremental work toward reflection and action.

## CHAPTER 7

### CONCLUSION

#### 7.1 Contributions

I now summarize the four contributions of this work to research in parent-education ICTs and to assets-based work in the field of HCI.

##### 7.1.1 An Assets-Based Description of the Ecology of Parental Engagement

A critical contribution of this dissertation phase was a rich, assets-based description of how online and offline information channels are supporting parents from nondominant backgrounds in the U.S.—and specifically low-income Latin\* immigrants parents—as they access, make sense, and use educational resources for their children. Specifically, this dissertation describes the different actors in the system, what their goals are, and the capacities they mobilize to work towards those goals. It provides an overview of what works and how what works could be useful for addressing what does not work. This, in turn, can inform assets-based opportunities for transformation.

Looking at educational systems nationwide, Study 1 (S1 - Section 4.1) contributed a detailed description of how parents across socio-economic status (SES) experience both online and offline parent-education communication spaces, nationwide. In particular, it highlighted how online spaces, especially school-mandated ones, tend to restrict parents' information-management and social capacities. The diversity of ICTs overly fragment information, confusing parents about existing resources and how to use them. Further, school-mandated spaces highly restrict information to school interests which are often not aligned with parents' capacities, goals, and financial resources. Although all parents harness their capacities to navigate these problems, educational and technological systems are

not well-prepared to work with the capacities of parents from a lower SES background. Most of these parents resort to strategies that tend to limit the richness and adequateness of the produced results (e.g., trying to develop a close relationship with teachers and school staff or searching information online).

Acknowledging the problem is not due to a lack of capacities but one of many capacities' misalignment, Study 2 (S2 - Section 4.2) relied on ethnographic fieldwork to examine how capacities interact in the specific ecology of low-income Latin\* immigrant parents. This study unearthed three key misalignments, hindering opportunities for ICT to effectively support parents. In doing so, it expanded how S1's findings relate to the reality of Latin\* parents. First, it showed that much of the information fragmentation in the network responds to educational actors' (e.g., teachers) capacity to select ICTs that support educational, class-based purposes but that are too far away from parents' everyday goals and practices. Second, in reference to providing parents with non-school information and resources that can be of interest and benefit for Latin\* parents, this study illuminated that supporting organizations are critical for that purpose but struggle to curate that information for parents to use it when they need it. Lastly, S2 stressed how schools' capacity to protect families' privacy lead them to promote ICTs that prevent the personal, 2-way, teacher-parent, and parent-parent communication that Latin\* parents need to share meaningful information.

Study 2 also highlighted how the work of parent-education liaisons is critical to the effective operation of parents' ecology: they are able to align different actors' capacities and create information channels that would otherwise not exist. Focusing on these liaisons' capacity-alignment work, Study 3 (S3 - Section 4.3) identified three essential issues hindering liaisons capacity to create information patchworks. First, an uneven distribution of knowledge amongst liaisons aggravated by a lack of knowledge-sharing platforms. Second, an excessive workload for each liaison, which prevents them from offering all parents the close, one-on-one interaction needed to enrich information transfer opportunities. Third,

authorities' and decision-makers' generally low understanding of liaisons' critical work, which curtails the support liaisons need to effectively create information patchworks in the ecology.

Finally, Study 4 relied on PD to explore parents' situated perspective of their capacities and goals, and how the capacities and actors in the ecology related to theirs. This study unpacked how parents mobilize four capacities when supporting their children's education: negotiating information on one-on-one interactions, self-empowering through failure-free learning and serving, making sense of the world via consejos, and orchestrating resources for enabling their children's learning experiences. In doing so, it enriched the previously gathered analysis of capacities in the ecology. For example, it unearthed that an additional reason behind liaisons' struggles to reach to parents, beyond their excessive workload, is how they present opportunities to serve and learn to parents. They do not stress or guarantee these to be failure-free as parents need.

Such a detail, assets-based information-oriented exploration of Latin\* immigrant parents' ecology further informs HCI discussions on how technology can support families from non-dominant backgrounds. Further, it illuminates diverse opportunities for technology designers and decision-makers at the school system to enable capacity-focused information channels that support the engagement of immigrant parents in the U.S. and beyond.

### 7.1.2 Parent-Education Technologies: Assets-Based Design Opportunities

This phase also contributes to the work of HCI with nondominant families by shedding light on design orientations for parent-education technologies that can leverage and further amplify parents' capacities.

Leveraging the accounts of parents from different backgrounds across the U.S., Study 1 revealed that, to align with parents' capacities, technologies need to foster community spaces unbounded from school or classroom limits. These spaces should all allow community members (e.g., parents, teachers, and other actors) to 1) define community's bound-

aries; 2) create as many interconnected community-based interaction spaces as needed, all contributing to a common repository of information; and 3) access school- and non-school resources from this common repository, in a timely and context-sensitive manner.

Through a two-year-long multi-ethnographic inquiry, Study 2 illuminated how to enact S1's insights for an intelligent interaction space in the ecology of Latin\* immigrant parents. First, it became clear that for Latin\* parents it is unpractical to create yet another communication platform, parent-education ICTs need to harness what parents already use. Second, a common repository of resources is needed but, to work for Latin\* parents, it needs to include information from supporting organizations. Third, parent-education ICTs need to support parents to gradually develop close ties with others. This study also revealed that a second design opportunity specifically desirable for Latin\* parents is for existing parent-education ICTs to include learning goals that are important to parents (e.g., learning about the schooling system in the U.S.).

In focusing on the work of bilingual parent-education liaisons, Study 3 offered two novel design orientations for supporting liaisons' capacity to engage in personal interactions with parents. First, to enable remote, micro-volunteering work can help liaisons gather more hands for balancing their workload and lower barriers for parents contributing to their communities. Second, devoting efforts to rather enable interaction spaces that can support liaisons in learning more from each others' existing work and contacts with diverse resources so as to put forward more ideas for motivating parents' participation. Third, to re-design existing parent-education ICTs for enabling liaisons to remotely monitor parents' use of these technologies and guide parents when they have doubts about how to proceed.

Studies 4 and 5 contributed parents' and institutional actors' situated, bottom-up perspective on all the design possibilities that had emerged up until that point. In facilitating parents' reflections on their capacities and possible uses of their capacities in design, Study 4 complicated the former design possibilities. In particular, it posed relevant questions about how these possibilities could cater to parents' capacities and goals. Table 7.1

summarizes the four design directions that the three studies in Phase 1 suggested and the questions that Study 4 proposed to each direction.

Finally, Study 5, presented all the design insights gathered up until that moment to institutional actors, motivating them to reflect on their practice, on their use of ICTs, and on the goals of the educational system in regards to parents. As a result, these actors narrowed the previous directions down to two: an intelligent assistant for the ecology, and a remote, micro-volunteering platform.

Their iteration on existing designs, however, entailed a radical turn away from traditional parent-education ICTs. Working from assets, they clarified that the problem that parent-education ICTs need to address is not one of information poverty but one of lack for meaning-making and social support. Further, they challenged the notion that parent-education ICTs should be for the parent-school relation, administered by schools, and about educational resources only. Their call was for a new generation of parent-education ICTs that attends to all ecology actors rather than serving parents directly; ICTs, they proposed, need to support connections and mutual learning amongst the different members of the educational system. Further, in working from an assets-based perspective, institutional actors called for the system and parent-education ICT designers to be more careful about the goals they promote when introducing novel technologies to parents. For them, the goal should not be enhancing communication or information transfer, but enabling parents to gradually become more familiar and develop close ties with local actors and resources. Further, the introduction of these types of technological services for parents, that are more oriented towards meaning-making and connection-building, needs to take place incrementally, so that parents have time to make sense of these technologies and trust them.

Each one of the different design pathways and insights that these studies provide entail an important starting point for researchers and designers working technology-based social innovation with schools and other educational organizations. They can use these ideas to build prototypes for further exploring design directions with parents and institutional

actors, inside the US and beyond. Further, the design implications that institutional actors in Study 5 generated throughout a PD process constitute an important critique of how the educational system currently sees parent-education ICTs. As such, they can inform talks, workshops and guidelines for practitioners, decision-makers at the school district level, and software companies trying to work with non-dominant communities.

Table 7.1: Details of field sites per recruited groups

<p style="text-align: center;"><b>Phase 1</b></p> <p style="text-align: center;"><b>Design Pathways</b></p>	<p style="text-align: center;"><b>Phase 2</b></p> <p style="text-align: center;"><b>Design Questions</b></p>
<p>Intelligent, interconnected interaction spaces working in parents’ existing information channels with figures of authority, enabling all actors to share information and contribute to a unified repository of experiences and resources.</p>	<p>How to avoid depending on only one actor of the ecology?</p>
<p>Re-design of existing educational and parent-education apps to provide parents with more opportunities to make sense of these apps and offer bilingual liaisons better monitoring and guiding mechanisms</p>	<p>How to support parents’ sense of control over the academic support they are providing to their children?</p>
<p>Remote volunteering apps for parents to, incrementally, work with bilingual liaisons in activities that benefit the school community.</p>	<p>How to motivate parents to collaborate with other community actors?</p>



Table 7.1 ... continued

<p style="text-align: center;"><b>Phase 1</b></p> <p style="text-align: center;"><b>Design Pathways</b></p>	<p style="text-align: center;"><b>Phase 2</b></p> <p style="text-align: center;"><b>Design Questions</b></p>
<p>Interaction spaces for liaisons to share knowledge, experiences, and resources.</p>	<p>How to support liaisons in fostering parent-parent collaboration?</p>

### 7.1.3 A Top-Down, Multi-Perspective Approach for Analyzing the Design Potential of Assets

Assets-based design work in HCI is still emergent [3, 7, 16, 17, 53, 70]. Similar to many participatory approaches to change [73, 74, 180], much assets-based interventionist work within and outside the field have operated within the geographic boundaries of very particular communities [3, 78, 171]. This work suggests particular challenges for analyzing assets, their current uses, and the opportunities for that asset to support a particular design purpose. Such a challenge becomes critically harder to address when trying to unpack the design potential of assets operating in a large-scale system. A critical aspect to expand on that particular aspect is how to go beyond an analysis that represents a static map of assets operating in the system. That is, how to gather a complex yet operational view of systemic assets that can inform communities when analyzing the design potential of their assets.

Throughout Study 1 to 4, this dissertation advances explorations on these pending but critical analytical challenges. They demonstrate a top down, multi-perspective approach for attaining a rich understanding of assets at a large-scale and community level. Specifically, they first offer rich view of how existing digital and non-digital spaces in a system support individuals in mobilizing their assets (See Section 4.1). They then reveal how assets align in the system and how mediators manage to transform gaps into alignments, so as to enable effective relations to take place, supporting vulnerable groups access to critical resources for action (See Section 4.2 and 4.3). Finally, they offer a community-based view of assets

as parents use them to solve different parenting and information problems (See Section 5.1).

As described in Chapter 6, this multi-perspective approach manages to illuminate how the assets that operate in a large-scale system relate, inform, and sometimes limit, the assets operating at a community-level.

In demonstrating this analytical approach, this dissertation makes an important contribution to the increasing number of communities in HCI engaging with issues of social justice and interested in designing for sustainable social change [61, 71, 172, 295, 296]). It sheds light on the need for designers working assets-based approaches to adopt operationalizable definitions of assets that recognize their complexity as dynamic capacities that may not always serve particular goals for design. Further it offers insights on analytical perspectives that can be of use to those working technological interventions in other large-scale systems such as public health, and labor.

#### 7.1.4 Facilitating Bottom-Up Assets-Based PD: Methodological Considerations

As an emerging approach in HCI [3, 7, 16, 17, 53, 70], assets-based design also poses methodological challenges than become more evident and pressing when resorting to PD for working with vulnerable communities: what activities can help emphasize and sometimes, prioritize assets over needs, how to conduct them, and what outcomes to expect? Studies 4 and 5 demonstrate how to conduct assets-based PD when working bottom-up, first with a vulnerable group (parents), and then with institutional actors at a meso-level.

As Chapter 6 describes, such a demonstration contributes critical considerations for organizing the activities of assets-based PD endeavors that seek to attain a bottom-up impact, working with vulnerable groups first, and transferring those insights to institutional actors later. In particular, it shows the demands of this approach for designers to constantly foster participants' trust in a process that challenges traditional deficit-based ways of thinking. Further, it highlights the relevance for designers to provide elements for participants to

continually return to appreciating and considering assets in relation to existing challenges. Such a constant push towards appreciating assets forces designers and participants to re-think how technology fits in design and in participants' everyday lives.

The methodological lessons that this dissertation provides contribute to the increasing interest of HCI researchers in understanding approaches for supporting vulnerable communities in attaining sustainable, emancipatory transformations [61, 71, 172, 295, 296]. In particular, they provide designers with reflections on the high-level implications of an assets-based design approach: acknowledging the significant research and design effort needed in work before the work, seeing technology as an intermediary facilitating the ongoing journey, and embracing slow incremental work toward reflection and action.

## **7.2 Limitations and Future Work**

This work produced rich knowledge about how parent-education ICTs are operating in the educational system and how to design them in ways that support Latin\* parents. Via the qualitative methods it relies on, it fostered many changes across the system: it created social connections amongst parents, and amongst institutional actors; it helped institutional actors in updating their practices to better interact with parents; it led parents to various realizations about their capacities, the systems that surround them, and the technologies they use. However, it did not produce an intervention. Further, there is no quantifiable evaluation that validate the design recommendations this work offers nor a way to attest the analytical and methodological approach it demonstrates will lead to a successful intervention.

This lack quantifiable evidence of success responds to a personal decision. As an outsider to the country, the educational system, and the Latin\* community, gaining the knowledge and trust needed to engage in an assets-based design approach took time. As I learned about the system, I realized information-wise, it was already too fragmented with a wide variety of ICTs which number kept quickly increasing. Demands for parents to learn about new information and technology practices also kept increasing. Intervening in the system,

adding a technological artifact to parents, teachers, and other actors, as such, seem like an extremely high risk to take. A failed or unsustainable intervention could further fragment parents' trust towards parent-education ICTs. Further, it could deter from the trust-building process I was working on. It seem more relevant for actors in the system, and myself, to learn about what are desirable and feasible routes for technology to support parents in the system. As such, I geared this work as one that would be work with actors in learning about the system, the assets in it, their aspirations, and how to work towards them with or without technology.

It is only now, that I have acted as member of the Latin\* community, built connections with different actors across the educational system, and worked in participatory design engagements with parents and institutional actors, that I see interventionist explorations as feasible. In alignment with the lessons learned in this work, my agenda for the future work recognizes the value of incremental change and will seek to work accordingly. Next steps in my research entail taking the insights gained during PD work institutional actors back go parents and work with them in generating prototypes of technology-enhanced interventions that we could then use for applying to grants that enable parents and me to work together in realizing the intervention, incrementally.

Further, these prototypes can be a useful communication tool for uplifting parents' voices about the changes they require in the educational system. I plan to explore with parents the possibility of for them to present these prototypes to teachers, parent-teacher associations, macro-level institutional actors, and software companies, engaging them in relevant discussions about needed changes in the educational system. While this discussions might not lead to radical implementations or immediate policy changes in the system, they can help these different actors to reflect on their practices and approaches when working with parents who are constantly kept at the margins of the norm.

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