Aspirations-Based Design

Neha Kumar
Georgia Institute of Technology, USA
neha.kumar@gatech.edu

Marisol Wong-Villacres
Georgia Institute of Technology, USA
Escuela Superior Politecnica del Litoral, Ecuador
lvillacr@gatech.edu[espol.edu.ec]

Naveena Karusala
University of Washington, USA
naveenak@cs.washington.edu

Aditya Vishwanath
Stanford University, USA
vishwanath@stanford.edu

Arkadeep Kumar
Lawrence Berkeley National Lab, USA
arkadeekumar@lbl.gov

Azra Ismail
Georgia Institute of Technology, USA
azraismail@gatech.edu

ABSTRACT

We present a case for aspirations-based design by drawing on a qualitative inquiry into the lives of young girls in rural West Bengal (India). These girls form a particularly vulnerable population, coming from an area known to be susceptible to sex trafficking and crimes against women. We leverage our findings to engage with Kentaro Toyama’s call for greater attention to aspirations in designing technology for development [51]. We highlight the aspirations of and for these girls and reflect on the embedded, temporal, and mutable qualities of these aspirations. Finally, we examine how an aspirations-based design approach might factor these qualities into technology design. Although our analysis draws on empirical findings from rural/suburban India, the insights derived from this research are relevant for the process of designing technologies towards fulfillment of aspirations, more generally.

CCS CONCEPTS
• Human-centered computing → Empirical studies in HCI;

KEYWORDS
Aspirations; Design; Gender; India; Qualitative; HCI4D

ACM Reference Format:

1 INTRODUCTION

Research and practice within the field of Human-Computer Interaction (HCI) are inherently committed to building better futures, through the realization of novel, creative, and useful ways for computing technologies to support humankind. This includes exploring ways for technology to improve the futures of variously vulnerable populations, including those who are socioeconomically disadvantaged across the world. In this paper, we turn precisely to those lives and the intersection of HCI and global development (HCI4D). We focus on individuals’ use of technology to engage with their futures in such contexts of vulnerability and how they achieve goals, targets, and outcomes. We draw attention, in particular, to the aspirations of such individuals, or mechanisms they might employ to engage with potential futures.

In his essay on the “capacity to aspire”, Arjun Appadurai derives a connection between the capacity to engage with aspirations and the development discourse [4]. The poorer a person is, he says, the more limited is one’s universe of aspirations. For development, Appadurai argues, the poor must expand their “navigational map”, and their capacity to aspire, which might then lead to improved livelihoods [4]. Here, he draws directly from Amartya Sen’s capability approach, which declares individual capability foundational to socioeconomic development. Kentaro Toyama extends this line of thought by emphasizing the need for development-focused research to examine aspirations. Toyama defines an aspiration as a desire that is “persistent and aiming for something higher than one’s current situation” [52]. He asserts that the field of Information and Communication Technology and Development (ICTD) must shift focus from addressing needs, situated much in the present, to operationalizing aspirations for change to occur [51, 52]. He further recommends that “an aspiration-focus would tilt development efforts toward programs that help build people’s own ability to achieve their aspirations” [51].

In this paper, we build on Toyama’s recommendations to explore how aspirations may be operationalized in designing for development, drawing on our findings from fieldwork conducted at an after-school center for girls in rural West Bengal (India). This region is notorious for its problems of trafficking and child marriage [46], and the chief objective of the center we studied was to protect its students from both. Our research focuses on the aspirations of (and for) these girls and examines how technology design might contribute towards generating, fulfilling, sustaining, and raising their aspirations. We use our analysis to first complicate the lens of aspirations that Toyama engages with [51]. In addition, we explore how research in HCI in general, and HCI4D in particular, might adopt and benefit from moving towards aspirations-based design.

We begin by presenting background on conversations around aspirations within HCI, highlighting the nascent stages these are in. We also provide a summary of related literature on gender and
HCI4D that we enrich, an area that has become an increasingly active research focus in recent years. After describing the qualitative methodology underlying our research, we present our findings. Here, we detail how an after-school center in rural West Bengal introduced and moderated its (girl) students’ engagement with technology to shape their futures so as to protect them from being trafficked or falling victim to child marriage. We explain how technology presents avenues to fulfill aspirations, and how the girls exercise their agency, reshaping these aspirations in the process. In our discussion, we highlight three critical considerations for future research on aspirations-based design—first, aspirations are embedded in larger ecologies and need to be assessed as such; second, aspirations can pertain to different timelines, which need to be accommodated accordingly; and third, aspirations are mutable—they can change and be reshaped over time, and any future-oriented research and design must take this into consideration.

Our contributions with this paper are three-fold. First, we present empirical research conducted in rural India that highlights the meaning and hope that technology represents in the context of extremely vulnerable populations—as viewed through the lens of their aspirations, and how these aspirations evolve over time. Second, we extend conversations on aspirations within HCI4D contexts by complicating Toyama’s proposal for prioritizing aspirations over needs. Finally, we introduce the larger HCI community to the commitment of designing based on aspirations, and offer key considerations for this approach by drawing on our empirical research.

2 RELATED WORK

Research within HCI, and computing more broadly, is yet to engage critically and meaningfully with the notion of aspirations. A scrutiny of the literature in the Association of Computing Machinery’s Digital Library (ACM DL) reveals that with 340 results (including some duplicates), the word aspiration has been used to refer to a wide range of abstract concepts such as needs, desires, hopes, and wants (e.g., [6, 12, 38])—the many terms one might use towards imagining short- and/or long-term futures. If we look at who aspires, we end up with individuals (e.g., women, students, designers [6, 12]), organizations (e.g., non-profits, government agencies [24, 48]), disciplines (e.g., HCI, Ubicomp [11, 17]), technologies (e.g., network algorithms, platforms [1, 34]), and more. Some design research also articulates the idea of design as a way of thinking about aspirations, say, of a city [10], and aspirational personas [42]. Even with close to 340 attempts at engaging with the term, however, computing-related research—and HCI in particular—are yet to articulate what an aspiration is and how it might be operationalized in the context of technology design.

This is not to say that HCI research is not future-oriented at its very core. In its focus on technological development, outlining implications and recommendations for design, and exploring affordances of emerging technologies, it is constantly looking to pave the way for and generate collective new futures. Individual futures also make an appearance in literature targeting behavior change, for example, which examines how technology design might assist in improving individual lives based on personal goals (e.g., [8, 16, 41]). More fundamentally, the field of HCI has long placed paramount importance on the user and on user-centered design, but a mere centering of the interests of the user does not ensure allegiance to explicitly recognizing, raising, or otherwise engaging the user’s aspirations. An explicit focus on aspirations can help in articulating, drawing attention to, and expanding users’ current and potential imaginations and desires, to improve futures as Sen and Appadurai suggest [4]. With this focus, a lens of aspirations has been proposed across disciplines, in the context of global development (e.g., [4]), but also education (e.g., [14, 54]) and economics (e.g., [15, 44]), among others. Our research aims to make a contribution to both HCI4D and the larger HCI community by further developing this lens for informing technology design.

Prior research within ICTD has also engaged with aspirations over the years. Pal and his colleagues have explored the intersection of aspirations and technology in a number of works [37–39]. Ray and Kurian were the first to discuss aspirations as a development indicator in 2010 [45]. This body of work makes a case for paying greater attention to aspirations in ICTD while also highlighting the challenges this may bring. More recently, Toyama has noted a lack of attention to aspirations where he asserts that HCI as a discipline engages deeply with user needs while the field of ICTD (that subsumes HCI4D) must move its focus beyond needs alone, be it a need for shoes when one has plenty or a need for food from a place of lack [51, 52]. This proposal by Toyama for considering aspirations situates itself in a critique of user-centered design that he views as being predominantly needs-based [52].

We embrace Toyama’s call for ICTD and HCI4D to focus on aspirations, but also disagree with his simultaneous critique that design focuses solely on addressing needs of the present. There is a dimension of anticipated social and economic mobility latent beneath ICTD’s treatment of needs, which is often missing in that of HCI. It is this dimension that we draw attention to as we articulate a richer and more complex landscape for HCI research to explore. In doing so, our goal is not to critique and rebut Toyama’s work but to extend and operationalize it. There is a dimension of anticipated social and economic mobility latent beneath ICTD’s treatment of needs, which is not always present in that of HCI. It is this dimension of HCI’s conceptualization of needs that our paper seeks to address.

We engage closely with Kumar’s study of the adoption of Facebook among young (male) adults in New Delhi, India, primarily via the increasingly affordable mobile internet [27]. She highlights how their aspirations to “see beyond their world” lead them to connect on avenues such as Facebook, which in turn equips them with increased agency to generate and explore greater aspirations. We engage with this aspirations-avenues-agency framework in Kumar’s paper [27] to analyze the data collected in Baruipur, Bengal, at an after-school center for girls. We also draw motivation from Toyama’s recommendations [51, 52] and provide an enriched understanding of the aspirations lens, discussing how it might inform and shape technology design. In the language of penalties and privileges that Wong-Villacres et al. introduced towards designing for intersections [53], we view aspirations as privileges that might assist towards technology design, although they may also act as penalties depending on how certain individuals and groups might experience them on an everyday basis.
In addition to proposing an aspirations-based design approach, our research also builds on HCI4D’s growing focus on gender-related research in the areas of education, health, and access, among others [9]. Ahmed et al. have examined the impact of gender-based limits on computing, highlighting the challenges of involving women—particularly those in the Global South—in user research, design, deployment, and use of technologies [2, 3]. HCI4D research has also engaged with Bardzell’s feminist HCI framework [5] to argue for closer examination of the agency of rural Indian women [28] and concerns around women’s safety [23], both impacted by stringent social and patriarchal norms, the impact of which has been covered extensively from both a gender studies (e.g., [40, 43, 47]) and development (e.g., [7, 29]) perspective. Recent work has also noted the challenges that arise when trying to apply feminist values from the Global North to patriarchal contexts in the Global South [50], and Ismail and colleagues have drawn on the work of feminist scholars Donna Haraway and Chandra Mohanty [13, 32], noting the need for HCI research to expand its engagement with diverse knowledges and feminisms, particularly those generated and held by women in the Global South [18, 19]. We extend this scholarship, focusing not so much on the challenge-ridden presents of the young women we study, but the positive futures they are driven to create, exploring the ways in which technology might contribute through aspirations-based design.

3 METHODOLOGY

We describe below the context for our study (as approved by our institutional review board), our study participants and the methods we used, how we analyzed our data, and our own positionality in conducting this research.

3.1 Study Context

Our study took place in Baruipur, approximately 25 km from Kolkata—capital city of the Indian state of West Bengal. The after-school center we studied was run by the local non-profit Pragati (all names have been anonymized). Pragati was established over 40 years ago with the mission of providing education and training for uplifting and empowering female youth in this region. Women form a particularly vulnerable population because of the prevalence of sex trafficking in the area. Trafficked women are either taken to other states in India, or forced into prostitution. This also encourages early marriage of daughters; parents prefer to have their daughters married as soon as they reached puberty in the belief that this will circumvent the risk of trafficking. The threat posed by trafficking also limits the freedom of movement that the women have in this region; women tend to feel unsafe venturing out of their villages after dusk. This concern was also shared by the Pragati coordinator with discussing potential future careers of the young women; she mentioned that she would prefer that the girls at Pragati find jobs near their villages rather than commute daily to the city of Kolkata.

Gender bias is prominently visible throughout rural and urban India, and has been reported, analyzed, and discussed widely (e.g., [21, 25, 30, 33]). In many parts of rural India, daughters are frequently perceived as a burden by their parents due to the expenditure associated with their marriage, most of which takes place in the form of dowry. Limited financial means make the parents wary of supporting their daughters’ education because they do not view it as offering a means of self-reliance to girls in the future. Rather, there is a profound belief that since girls will get married and move out to stay with the groom’s family, there is no point in educating them to give them a chance of earning a living on their own. There is also the potential stigma of being harassed on the streets by male youth and adults, as soon as girls reach adolescence. To avoid such situations, the mobilities of girls are heavily restricted, and parents are inclined to arrange their marriages at very young ages.

3.2 Participants and Methods

Our study took place within the premises of Pragati. The center has two large halls that are segmented into classrooms as needed; there are four additional rooms for administrative work. Four desktops at the center are operated by the staff. Pragati has four salaried administrative staff—including two social workers, one accountant, and one documentation officer—in addition to the coordinator. There were four teachers during the time of our study, and more than 350 girls, with 150 of them in grades 11 and 12. These girls are given regular orientation on issues such as adolescent health, child marriage, teen pregnancy, and domestic violence, not the norm for mainstream schools (in this region or in India more broadly). All girls are taught children’s rights; those older than 11 are taught adolescents’ rights as well.

Over the course of 1.5 years, we visited Pragati a total of four times, separated by six months each. During these visits, we conducted 35 hours of participant observation at the center and nearby villages. Our research participants included various stakeholders in the Pragati ecosystem. We conducted semi-structured interviews with 26 participants—3 teachers, 3 staff members, 10 mothers (no fathers were available for interviews), and 10 twelfth grade students. In addition, we did group interviews with 40 other students. The goal of all data collection was to gain a deeper insight into the day-to-day activities and challenges that the (female) students engaged with and aspired to overcome. The girls we met with had been associated with the school for at least three to five years. Most were first-generation learners from families of limited financial means. During our visits, the girls organized dance dramas and street plays, which were themed around gender-sensitive issues like the importance of educating the girl child and/or the harmful effects of early marriage. While it is plausible that these were not everyday occurrences and possibly organized especially for us, the performances demonstrated that the girls are trained comprehensively on these topics and are able to communicate their awareness. In one visit, we also observed a gender-sensitization workshop that was organized by a group of girls and their mothers. The school routinely uses various methods such as street plays, songs, and slogans to make the larger rural community more aware of gender equality and recognize the importance of educating girls.

3.3 Data Analysis

All data was collected in Bengali (the local language). Interviews were recorded, transcribed, and translated, before they were analyzed inductively by the authors, in conjunction with field notes. The process of analysis was iterative, and we developed codes that we refined repeatedly in order to arrive at the analysis we present.
below, following the guidelines offered by Merriam [31]. We began with coding at the sentence level and iterated multiple times. The different stakeholder perspectives—of the school, the students, and mothers—all pointed to the futures of the girls that they aspired towards. Once the theme of aspirations began to emerge, we went back and forth with the related work on aspirations cited above, using codes such as “short-term aspirations”, “long-term aspirations”, “social avenues”, and “technological avenues”, among others. In particular, we studied the framework offered by Kumar [27] and then analyzed our data in connection with it. We use this framework to organize our findings, because it allows us to recognize the role that aspirations, agency, and a supporting sociotechnical infrastructure can play towards tractable social change. The framework was used by Kumar to report and analyze findings focused on male participants in urban India; we engage with and extend it to appropriately accommodate our findings on female participants in rural India.

3.4 Self-Disclosure
Much of the data collection and analysis was conducted by Neha and Arkadeep, who are from the upper-middle class and of Indian origin but reside in the US, with a sum total of more than ten years of research experience in various marginalized settings across India. The other four authors contributed to the articulation of the paper’s contributions and engagement with the lens of aspirations. We are all strong advocates of social equity and justice, colored by the desire to work towards a world that offers equal opportunities across genders. Given our commitment to social change that can create a space for women and daughters to find themselves empowered, our representation of our subjects and field sites may be biased. We are also shaped by the fact that we are based in the US; this has conditioned our understanding of desirable gender norms with Western notions of feminism.

3.5 Limitations
Although we collected data over multiple visits, we were also limited in terms of the participants we were able to talk to, and thus the perspectives we gained access to. We were unable to interview fathers as they were not available to be interviewed and were generally less involved in the activities at the center. We do however acknowledge that fathers might have different perspectives on their aspirations for their daughters and different ways of ensuring those aspirations are reached. Additionally, we conducted interviews with some students in groups, which may have affected how they formulated and presented their aspirations among their peers or students in lower and higher grades. We did not always encounter the same participants in every visit, though there was substantial overlap. These limitations demonstrate how aspirations are embedded within communities as a whole, partial views of which are presented in this paper.

4 FINDINGS
We structure our findings in the order of the aspirations of the girls (and of Pragati/parents for the girls), the avenues that are available (or not) for the girls to fulfill their aspirations, and the agency the girls are able to exercise towards further aspirations (as well as the factors that challenge this agency). We draw on this aspirations-avenues-agency framework from Kumar’s Facebook study [27] to highlight qualities of aspirations that emerged in our research, and how the creation and fulfillment of these aspirations are functions of the larger ecologies that we studied. Kumar studied male youth in urban India to demonstrate the aspirations that they try to fulfill through technological means [27]. We use our data to enrich this same framework in three ways. First, our participants include female, not male, youth. Second, urban Delhi locales are quite different and much less conservative and resource-constrained compared to the environs of Baruipur in West Bengal. Third, we found that participants relied on avenues that were both social and technological, while Kumar’s focus was primarily on ICT such as mobile phones and Facebook. Although there may be several other low- and high-level differentiators at play, such as the role of the government in failing to adequately check the growth of the trafficking industry, the above factors are the ones we draw particular attention to.

4.1 Ecologies of Aspirations
When we approached Pragati to understand and discuss more about the role that technology played in its learning environment towards achieving educational goals, participants’ inputs immediately changed our focus. We were informed that Pragati’s first and foremost priority was to ensure that the girls stayed in school so they would not be trafficked and/or married early; educational goals came second. For the staff, it was most essential thus that the girls participated in the center as protection from the world outside, so that they could reassure the parents that their daughters would be able to continue on to study in college and get a job, gaining financial independence and taking care of their parents. This was conveyed to us as Pragati’s mission several times over. These were the aspirations Pragati’s staff collectively held for the girls.

In affirming their keenness to avoid early marriage, more senior (girl) students also laid out their aspirations, where they asserted their desire to receive the requisite training for securing “respectable” jobs. They mentioned that, in the ideal scenario, they imagined themselves working day jobs and financially supporting their families. They also expressed the desire to study further and attain a college education, also bearing the cost of this education themselves. This was in part due to their reluctance to ask their parents to bear the burden of their expenses, but also because they wished to be financially independent. We gathered that the repeated emphasis on financial independence stemmed from the understanding that financial dependence would cause the parents to perceive their daughters as a burden and increase their inclination to marry them off. We contend that these aspirations for attaining financial independence were shaped, in no small part, by Pragati’s emphasis. Studying well was also viewed as a necessary step towards those aspirations. As Mira, one of the students at Pragati, said:

“If we don’t work and don’t earn money, they (our parents) will get us married, as we cannot contribute to the household income. Also, if we do not study, our parents will think we cannot have a future of financial independence, they will marry us off. We will do both.”

Since the girls (and staff) repeatedly brought up the topic of marriage, we asked them to elaborate on their views on marriage, and
if the girls themselves wished to get married in the future (or if not, why not). One girl shared her views:

“No, we do not want to get married. First, we should study and be educated, understand what the world is about, stand on our own feet, start earning money, so that we do not have to depend on anyone in future. Then, at the right age, if I want to, I will marry.”

Discussions on marriage formed a large part of the training the girls received at Pragati. As we probed further, we found that many girls voiced marriage to be restrictive and burdensome, that it would curtail their freedom and the possibilities that might otherwise be open to them. A few of them mentioned that they had seen their married friends becoming overwhelmed with the responsibilities of managing a household and meeting the demands of (and often being harassed by) their in-laws. Some of the girls shared that they had been successful in changing their parents’ conviction about getting them married. For example, Ekta—currently in college and previously supported by Pragati for her schooling—shared that she was the daughter of a mason and the first girl in her extended family to attend college. She explained that she now wanted to complete her college degree and become a teacher or get a job and become financially independent:

“I see the problems my mother faces for not being educated; she is dependent on my father for everything. She could have been a better parent if she was educated, taken better decisions about raising me.”

For Manju, who was studying in middle school, education was not just about future financial independence. She was convinced that being educated was valuable even just for facing day-to-day challenges—ones that she had seen others in her family grapple with regularly:

“For looking at the bus number and knowing if it goes in the right direction, or going to the doctor and getting the right medicines as per prescription from the pharmacy, taking medicines at the right dosage, or having knowledge about hygiene—these are the basic things which we need education for.”

Toyama differentiates between needs and aspirations suggesting that needs are “motivated by negative feelings”, while aspirations are “aimed at positive life changes” [52]. We see here, however, that these aspirations of the girls, though positive, are rooted in the dismal realities of their surroundings that they have been exposed to. Both where they would like to be headed (their intended destinations) and where they are coming from (their burdened origins) are important to grasp, because their aspirations for education and/or financial independence might not have been as strong if their conditioning by Pragati regarding their present realities had not emphasized these aspects. Thus, while their aspirations are certainly “intrinsically motivated” by a desire for a better life, they are also “extrinsically imposed” by Pragati and/or their parents—this is another point of difference between needs and aspirations as expressed by Toyama [52]. Additionally, while some aspirations may in fact be “persistent” (such as the desire for financial independence at some point in the future and forevermore), others (like Manju’s) may be more “fleeting” in comparison, focusing on changes that pertain to day-to-day living and not just targeting an improved reality far down the line. This is another distinction that Toyama makes between aspirations and needs [52]; we contend that these boundaries are more fuzzy than they might appear on the surface, and it may not be so straightforward a distinction to make, after all.

4.2 Avenues both Social and Technological

Avenues (or pathways as Ray and Kurian refer to them [45]) for fulfilling aspirations can have both social and technological facets, we found. This observation supports and extends beyond Kumar’s framing of avenues as the technological support mechanisms for youth to fulfill their aspirations [27]. Although the girls, their parents, and Pragati’s teachers and staff appeared to be broadly aligned in the aspirations shared above, no doubt because the girls and parents have been shaped and influenced thus by Pragati, there were some ways in which the parents’ and Pragati’s concern for the girls may also have been disempowering. We discuss these ways below.

We found that the girls we interviewed nurtured aspirations for jobs which, generally speaking, took them beyond traditional gender roles imposed by societal norms. Pragati’s constant and motivational training on issues of gender equality—as also evident from the performances we saw—appeared to have instilled a sense of confidence in the girls, and they hoped to pursue careers and earn money to sustain themselves, beyond being dependent on their husbands after marriage (which was the general default scenario). This was clear when they spoke of supporting their families financially, a responsibility traditionally attributed to the sons of the family in the sociocultural context they are part of. They had aspirations to appropriate technology to this end, and to use it towards building their careers and lives.

Pragati provides support so that the girls can complete school, supplying them with vocational training so they can attain self-reliance. This is one way to keep the girls in the program and protect them from early marriage, abuse, violence, and—in some cases—death. The Pragati coordinator shared that these girls had the option of pursuing several different forms of vocational training (such as creating handicrafts), but the girls “desired computer training only”.

This indicated a recognition on the part of the girls that computer training could result in a better future. In response, as an exploratory initiative, Pragati started computer and spoken English training with 40 girls. This did not cover all girls, however, and we spoke with several who were not among those 40 (as well as those who were). It was evident in our conversations that the girls who had not received the training had a strong desire for the training as well. One of them shared that she had started a training program to become a medical diagnostics lab technician and wished she had been allowed to enroll in the Pragati computer training as well.

It is understood that parents in these parts do not typically value girls’ education—particularly not as a means to financial empowerment and self-sufficiency [20]. This also makes sense when we consider that most, if not all, of these girls are first generation learners. In our interviews with the mothers, however, some expressed regret at not continuing their education or for marrying in adolescence. Others shared tales of domestic violence. When asked if they wanted their daughters to stay in school, there was a strong
consensus: "We want them to study!" One mother expressed that her daughter, whom she had brought up single-handedly, had been supported by Pragati through school because she was struggling to make ends meet. She shared her (aligned) hopes and aspirations for her own life, which would become accessible if she supported her daughter’s education:

"I have supported my child to become educated and now she is studying in a college to become a nurse. I hope she will take care of me in old age."

However, the tensions in some households and existing social structures were evident when one mother spoke up separately:

"We do want girls to stay in school, we support them in whatever way we can. We do not want them to get married early. However, the stronger voice in the household is that of the males."

Often, support does not only mean money but also expression of resistance against the dominant voice of the males, in the household and the larger milieu, in the decision to keep the girls in school, prevent their early marriage, and enable them to pursue careers of their own choice.

We described above the willingness with which Pragati’s staff and teachers, as well as some parents, supported the freedom and financial independence of the girls. This did not, however, extend to all aspects of their existence. For example, our findings highlighted that the girls had limited access to mobile phones and the internet, at best. Roughly a third of the girls we interviewed had mobile devices; around 15% had smartphones. When asked if they used the internet, they replied that they were familiar with Facebook and WhatsApp, but data plans were too expensive for them to afford. In Kumar’s study, mobile adoption and Facebook use by male youth was met with little disapproval by parents [27]. Supporting these observations, in our study, some girls complained that they were not allowed to use mobiles, but the boys in their families were.

"I go to study tuition (after school) in the evening, and sometimes I am late by a few minutes while returning. If I had the mobile I could have let them know. Also, the family then asks why we are late, but the boys are not asked reasons."

It was evident that mobile phone use by girls was discouraged in ways that—at least according to these girls—was not discouraged for their male counterparts. A male staff member at Pragati remarked that technology could be used for “good and bad” purposes. He explained that the girls who had mobiles could receive calls from strangers (mostly young men) and start a relationship, using the mobile phone for communication. This would be “bad” for the girls, according to him. He routinely warned the girls that such behavior might lead to sexual assault or trafficking, explaining:

“You get some missed call from an unknown person, then you ring back, and you talk, develop a relationship with that boy. Then that person calls you somewhere and you go there, and fall in trouble [alluding to sexual assault]. Moreover, we have got so many girls who have got trafficked due to mobiles!”

The avenues (social and technological) available to the male youth in [27] were much less constrained. In our case, the girls depended on the willing support of Pragati and parents (primarily mothers), who had reservations that were shaped by prevalent social norms even if they did wish to see these girls empowered. These reservations also ended up limiting the technological avenues available to the girls. Overall, fulfillment of aspirations is shaped by the nature of these avenues, and the social and the technological avenues must align for the desired change to take place.

4.3 Individual and Collective Agencies

We now reflect on the agency of the girls to achieve their aspirations, focusing on how this led to further aspirations. At the same time, we touch upon the factors that limit this agency, also potentially diminishing the aspirations that had surfaced in the first place. The girls showed keenness to secure jobs and become financially independent, to the extent that these aspirations aligned with those of Pragati and their mothers, and were supported rather than limited by available avenues. However, not every job was good enough.

Some of the girls who had received the computer and spoken English training had secured jobs, while others were still interviewing and shared with us the challenges they faced in these interviews. For example, the girls were concerned that their prospective employers preferred fairer skin, a common tendency among orthodox Indians [22], or if they would end up finding themselves in the same world (with the same values) that they were trying so hard to escape from to begin with. They were in the process of recalibrating the aspirations they had harbored earlier, recognizing that the jobs they had hoped to get were not quite the ones they were going to end up with (or so they perceived).

The girls who had landed jobs told us that their computer training at Pragati had prepared them for urban jobs as attendants at cinema multiplexes or shopping malls, sales assistants at retail stores, and call center employees. We spoke to a few who had started working. One was working as a data entry clerk in the city of Baruipur for INR 4,000 (USD 60) per month, while another was a server at a cinema in Kolkata for a monthly income of INR 7,000 (USD 100). The girls were not satisfied with their jobs; most complained about meager salaries, long work hours, and strenuous commutes to the city. There were concerns, also, about safety while traveling at night.

A teacher at Pragati also questioned how long these jobs would last and whether the entry-level jobs the girls were pursuing would ever mature into better-paying roles that could bring financial independence.

Not only do these jobs offer little scope for growth, they are often physically demanding and thus, according to the teacher, the girls would not be able to continue them beyond a point. Further, although the girls would like to attend college and continue their education, they are unable to pursue this aspiration because the jobs take up most or all of their time. This means that they must make a choice—either to attend college or to continue along the career paths they are currently on (where the future seems more bleak). On this point, the Pragati coordinator was of the opinion that the girls needed to attend college to have a better chance of getting access to more sustainable income sources:

"If they go to college, they will become mature and focus on their career. Right now there is no career option for them. They are looking for a retail job. For how long
can they do the retail job? They are thinking that if I earn money and give some amount to my parents, they will be happy. But what about the future?"

Before taking the computer and spoken English training, many of the girls had envisioned that their jobs would leave them enough time to continue studying. However, in their current situations, they were unable to pursue college since most of their time and energy were consumed by their jobs, as discussed above. Also, certain job openings were only available to college graduates (such as nursing); this knowledge was not always available to the girls.

In our first follow-up visit to Pragati (which took place six months after the first visit), we found that the girls who had viewed the computer training as having a lot of promise expressed disappointment and disillusionment. In their training, they had learned to type and use Microsoft Office tools, in addition to English and grooming skills. When we asked them what they had hoped their jobs would look like, they could not give a definite answer. However, they felt strongly that more computer training could have helped further:

"They taught us very basic computers, not enough for most of the work which is based on computers. If we had been given more of computer training as opposed to retail training it would have been better. They are giving us jobs at very good places but we are lagging because of our insufficient computer training."

The reports we heard about the jobs these girls are in currently (or plan to take on) highlighted the sentiment that these trainings do not exist independently of aspirations but are a motive force. We do not engage deeply with the first and third conjectures since these rely heavily on the definitions of needs and aspirations and particularly on these definitions being sufficiently distinguishable. As mentioned in our findings, we challenge this neat demarcation between aspirations and needs by asserting that the aspiration to achieve "something higher" here is rooted in the "negative" feelings regarding the present. Relatedly, "intrinsic motivations" [52] do not exist independently of "external impositions" [52]. This current lack, which shapes the "needs" of the moment, also impacts the "aspirations" for the future. We turn our attention then to the operationalization of these aspirations, engaging with our data to unearth three critical aspects that bear understanding.

5.1 Aspirations are Embedded

First, aspirations are embedded in larger sociotechnical assemblages that are not entirely intrinsic to the individual in question. Our findings highlighted that the aspirations of the girls at Pragati took root in their own past, and were a function of what their parents and Pragati teachers and staff had in mind for them. Their aspirations were embedded in an interwoven web of pre-existing power structures that was not easily disentangled, as Appadurai suggests [4]. In this web, aspirations sometimes aligned and, at other times, were in conflict. When the mother believed her daughter’s education to be tied to her own well-being later in life, and the daughter too was keen to be educated, aspirations were aligned towards this education. When a girl was keen to access the internet using her smartphone, but her parents were unable to afford this, or the Pragati teachers believed that it would not be safe to do so, aspirations were not aligned towards technology access. Thus, cultural values, gender beliefs and norms, notions of safety and internet access, all played a role in the fulfillment of aspirations here. It is important to question whose aspirations are being designed for, and whether it is a person, or a group of stakeholders whose aspirations may not all align. Considering how the forces that bring these aspirations to be embedded are individually acting on them and magnifying/diminishing them is critical to engaging in aspirations-based design.

The role of the researcher is also important in this assemblage. They influence—various variable degree—the aspirations that might be considered worthy of pursuit or not. For example, as shared in our statement of self-disclosure, we were keen to locate liberal, Western feminist ideas in the programs at Pragati, which may also have shaped their own initiatives over time—these aspirations would be challenging to segregate from each other. Further, understanding whose aspirations the researcher is biased towards within the assemblage is critical for framing his/her design objectives.

Beyond being embedded in sociotechnical assemblages, aspirations are also embedded in webs of their own. That is, aspirations can represent end goals, but they might also represent a means to an end goal. This implies, as Kumar alludes to as well [27], that aspirations are constantly shaping and reshaping other aspirations. We saw this in the case of computer training, which was viewed by our participants as a means to a better and financially secure life, allowing them to support their parents in their old age. We also saw that ownership of a smartphone and internet access were viewed as taking away from the aspiration of a better and safer future.

5 TOWARDS ASPIRATIONS-BASED DESIGN

As mentioned earlier, Kentaro Toyama has defined an aspiration as a desire that is "persistent and aiming for something higher than one’s current situation" [52]. In suggesting that aspirations are a ‘superior frame’ for conducting and analyzing efforts in technology for international development, he presents three conjectures—first, that aspirations are different from needs; second, that they can be operationalized; and third, that they are superior to needs as a motive force. We do not engage deeply with the first and third
Recognizing this inter-relatedness and embeddedness, and unpacking/addressing the different forces above is certainly key for effectively targeting aspirations through design. This also ties back to the (social and technological) avenues providing requisite support for aspirations [27]. It is no surprise that support structures matter, especially when the sociocultural constraints such as those acting against our participants are as strong. What is especially revealing from our study is, when contrasted with earlier work with male youth done in very similar contexts [27], it is critical for the right support structures to become available. Our study highlights that it is seen as okay for male youth to adopt, appropriate, and leverage technology because the barriers acting on our female participants do not place restrictions on them. The agency of these girls to fulfill their aspirations is limited by such barriers. In addition, the surrounding infrastructure (urban, in the case of the male youth) may also provide support that the girls are missing. On the flip side, the youth studied by Kumar did not have access to the supporting infrastructure of Pragati’s, which—if present—may have facilitated their growth and development as well.

5.2 Aspirations have Temporal Boundaries
Second, aspirations have temporal boundaries. This is to say that there exists an unknown chunk of time that must pass before an aspiration is fulfilled, and that time can vary from minutes to months to decades, depending on the aspiration. We must understand the time frame we are assessing aspirations within, even when they reside in an unforeseeable future. As noted in the case of the girls at Pragati, some aspirations (such as “looking at the bus number” or “going to the doctor and getting the right medicines”) were linked with the day-to-day, while others were much more long-term (such as becoming financially independent). Thus, one might question if a single design can handle these varying time frames.

In contrast to Don Norman’s claim that the good designer’s goal is to design things so that people can remain as they are [35], we suggest that the good designer’s goal is to design things so as to meet people where they are, and also that design can transport the user to get where he/she needs to go. According to Stolterman, “design works in pursuit of the non-existing and in the creation of an ultimate particular” [49]. Design can meet the user and assist in his/her mobility, helping him/her overcome barriers to fulfill aspirations and realize potential futures.

A thriving community exists within HCI, and has contributed a large body of work, on behavior change (e.g., [8, 26, 36]). HCI researchers targeting behavior change have been studying how humans can be persuaded to set goals for their lives that are better for them from a good health and well-being perspective, in the short- and long-term, and how technology design can address these goals. Here, we might view the behavior change goals as aspirations that the user might be seeking. This is just one example of work that the discipline of HCI aims to accomplish, where the design may not be focused entirely on the present or on the users’ staying where they are.

Creating a practice of setting adaptive goals could be one way in which design can assist in moving forward in increments, targeting a set of time frames that suit the aspiration in question. A designer may choose to focus on smaller time increments rather than larger ones, so that the route to aspirations as long-term goals may become more tractable. For example, in the case of our research participants, we found that financial independence was a common and widely accepted goal—across stakeholders—but it was also an intractable goal, being quite far into the future. Focusing on goals closer to the present could help in crafting a more feasible, more concrete path. Taking computer lessons was one such goal. However, the path from taking computer lessons to becoming financially independent was not completely clear. This then also became the source of disappointment for several of our participants, who realized that computer training was not sufficient. The designer(s) must also think through the path from shorter-term aspirations to longer-term ones, at the same time.

5.3 Aspirations are Mutable
Finally, aspirations are mutable; we saw in our study that they can change with time. The benefit of separating our visits to Pragati by six months was that we were able to observe how the aspirations of the girls had evolved, as they encountered new experiences, and previously set goals were thwarted. The enthusiasm they had for computer training to begin with, for example, had waned during our follow-up visits. Participants were able to recognize the limitations of what the training had to offer, and the possibilities it had earlier represented had faded. This is understandable, however, in light of the fact that the girls had not used computers before, and did not know how their lives would be different once they had. It is important, therefore, for design to allow for the mutability of aspirations, to allow for flexibility and learnability. As new experiences replace the old, individuals might wish to recalibrate their aspirations and aim for other, disparate goals.

Recognizing that aspirations are mutable means that we must also be able to shift the course of our design to target shifting aspirations. This may also work in reverse, that is, we might engage in technology design that aims to shift (that is, raise or redirect) existing aspirations. On the one hand, we saw that parents had shifted their aspirations—on account of Pragati’s intervention—in order to support their daughters, wanting them to study, find a job, and become financially independent without having to rely on marriage. This meant that Pragati had the trust of parents to plan ahead for their daughters, as they organized computer training and English learning classes. On the other hand, we saw that the aspiration for learning computer training had shifted over time, because it had failed to fulfill the expectations that the girls (and their parents) had nurtured. Designing technologies might also shift existing aspirations by magnifying or diminishing them, depending on how they are engaged. Not taking anything as a given can help ensure that design recognizes the fluidity and mutability of individuals’ and/or multiple stakeholders’ aspirations.

In sum, we outlined three dimensions for aspirations that might be considered in the process of designing for them. We first noted that aspirations are embedded in sociotechnical assemblages. Individuals’ aspirations are shaped by a host of factors beyond their control, and shaping aspirations might result in others being influenced as well. We found that aspirations can also be bound by different temporal boundaries, existing on different time scales. Although aspirations may be determined to be in the future, the
exact moment where they might be located or fulfilled could occur minutes, months, or decades later. Finally, aspirations might also shift trajectories across a third dimension. Next we discuss how these qualities, or dimensions, of aspirations might be factored into aspirations-based design.

6 OPERATIONALIZING ASPIRATIONS

What does it mean to engage in aspirations-based design? To operationalize aspirations and take an aspirations-based design approach, we suggest that it is crucial to factor the above three dimensions of aspirations into the design process. This means to acknowledge that aspirations are not individualized but embedded, not applicable to a fixed amount of time, nor set in stone. Each of these three qualities can guide us towards more design choices, as we realize the different ways in which aspirations might be shaped. Influencing parents in order to influence girls’ aspirations involves leveraging the embeddedness of aspirations. Recognizing that aspirations apply to variable lengths of time might guide us towards more concrete steps instead of unclear, unknown directions, such as breaking down financial stability into digestible, fathomable goals. Realizing that aspirations are mutable and can shift course might push us towards more resilient designs if we stop expecting that girls, for example, will always wish to learn computer training. We discuss these further in depth.

In the case of our participants, aspirations-based design might translate to generating greater knowledge of life trajectories of girls who were able to secure financial independence but also girls who were able to achieve shorter-term goals such as learning to use tools like Microsoft Excel or even just learning to operate a computer. In addition, learning of a happier reality far into the future may not be of as much use to the girls as learning of a happier reality tomorrow and seeing how it might take them into the future. Breaking down aspirations into modularized goals is a key contribution that design could make so that the path to fulfillment becomes visible and seems tractable.

Modularized design could also align with the mutability of aspirations by allowing for different trajectories to become visible. That is, highlighting that learning to use a computer could be useful in multiple jobs could leave options open and allow for multiple and flexible futures. This could be particularly useful for girls who may be held back in their imagination but gradually adjust to aim higher and higher. It could also help in shaping aspirations that are grounded in reality so as not to result in disappointment later. Additionally, the ability to retrace paths and try new ones could be encouraged. The costs and benefits of shifting trajectories could also be made visible, so that users can make informed choices and not bear the burden of assessing costs and benefits on their own.

The fact that aspirations are embedded must remind us to exercise caution and keep our own design efforts grounded in reality. For example, highlighting the potential for women’s empowerment can be dangerous when local definitions of and possibilities for empowerment are not well understood. This is a tension recently discussed at CHI 2018 in Sultana et al.’s research [50], which argues that prevalent HCI research and design strategies may fit more poorly than expected into rural women’s lives, and proposes possible alternative design directions. Indeed, societal structures may not be ready to support radical change. Design can try to support aspirations that are aligned. However, when they are not aligned, it can also do the work of aligning aspirations (potentially by getting parents to see the point in supporting their daughters’ aspirations). Identification of key intermediaries within the community, or potential role models and mentors, could be powerful in terms of providing necessary social support (or avenues). Technological “avenues” such as virtual reality (VR) content, as an example, that can be viewed on accessible mobile devices and low-cost viewers may provide a valuable and immersive learning experience, exposing individuals to novel perspectives. Such VR experiences may also be leveraged for their empathy-building affordances to bring about exposure and awareness among less-informed populations. Here we consider different affordances of VR, but other technologies might also be used in its place to offer their own sets of affordances.

Finally, we acknowledge that for engaging in aspirations-based design, a base level of reflectivity might be essential. In our own case, for example, although we had begun our research study with the aspiration of engaging in the design of education technologies that could be useful on a day-to-day basis for Pragati, we were moderately taken aback by Pragati’s emphasis on protecting the girls from child marriage instead. We reshaped our own aspirations to bring them in alignment with Pragati’s, finding also that the girls and their parents were largely motivated towards the long-term goal of financial independence—their aspirations had already been aligned before our study took place. Aligning aspirations such that the researchers’ are on the same page as the participants’ ecologies is thus critical. In this way, our own aspirations became embedded, recalibrated to the timelines we were operating in, and changed their course.

7 CONCLUSION

We conducted research in rural West Bengal (India) to engage with Kentaro Toyama’s clarion call for greater attention to aspirations in designing technology for global development [52]. Although we disagreed with the distinction Toyama creates between needs and aspirations for several reasons, we focused on extending his work to discuss what it might mean for the HCI community to operationalize aspirations. Thus, we further developed this lens to propose aspirations-based design. We reflected on the embedded, temporal, and mutable qualities of aspirations through our study of Pragati, as we focused on the evolution of the aspirations of our young female participants over 1.5 years. We also examined how an aspirations-based design approach might factor in the above qualities towards appropriate technology design for these girls. We conclude now by encouraging future future-oriented HCI research to engage more deeply with the lens of aspirations, even outside of the development context, to explore what aspirations-based design might look like in alternate spaces targeting alternate futures.

REFERENCES
Stephen F. King and Paul Brown. 2007. Fix My Street or else: Using the Internet
Predrag Klasnja, Sunny Consolvo, and Wanda Pratt. 2011. How to evaluate
Sunita Kishor. 1993. “May God Give Sons to All”: Gender and Child Mortality in
Azra Ismail, Naveena Karusala, and Neha Kumar. 2018. Bridging Disconnected
Shawoen Bardzell. 2018. Feminist HCI: taking stock and outlining an agenda for

Michael L. Best and Sylvia G Maier. 2007. Gender, culture and ICT use in rural
Sunny Consolvo, David W McDonald, and James A Landay. 2009. Theory-driven
design strategies for technologies that support behavior change in everyday life.
ACM, 405–414.

Neha Kumar. 2014. Facebook for self-empowerment? A study of Facebook
adoption in urban India. New Media & Society (2014), 1461448114549399.
Neha Kumar and Richard J Anderson. 2015. Mobile phones for maternal health in rural
Reene Kuriyan and Kathi R Kinet. 2007. Constructing class boundaries: Gender
and smart computing. In Information and Communication Technologies and
Anju Malhotra, Sidney Ruth Schuler, et al. 2005. Women@A9 empower-
ment as a variable in international development. Measuring empowerment: Cross-
Sharan B Merriam. 2002. Qualitative research in practice: Examples for discussion and
Chandra Taldapa Mohanty. 2005. Feminism without borders: Decolonizing theory,
practising solidarity. Zedahn.

PM Nair and Sankar Sen. 2005. Trafficking in women and children in India. Orient
Blackswan.
211–250. https://doi.org/10.1145/1010621.1010622
York, NY, USA.
Harri Oimar-Kukkonen. 2013. A foundation for the study of behavior change
support systems. Personal and ubiquitous computing, 17, 6 (2013), 1223–1235.
Joyojeet Pal. 2008. Computers and the promise of development: aspiration,
neoliberalism and “technology” in India’s ICTD enterprise. A paper presented at
comparing the Challenge of Technology for Development: Experiences from the

Joyojeet Pal, Tawfiq Ammari, Ramaswami Mahalingam, Ana Maria Huatla
Faro, and Meera Laksmanhan. 2013. Marginality, aspiration and accessibility in
ICTD. In Proceedings of the Sixth International Conference on Information
Joyojeet Pal, Meera Laksmanthan, and Kentaro Toyama. 2007. "My Child will be
Respected": Parental perspectives on computers in rural India. In Information
Conference on. IEEE, 1–9.
Reena Patel and Mary Jane C Parmenter. 2005. The persistence of traditional
gender roles in the information technology sector: A study of female engineers in
Stephen Purpura, Victoria Schwanda, Kaiton Williams, William Stabler,
and Phoebe Sengers. 2011. Fitfile: the design of a persuasive technology promoting
healthy behavior and ideal weight. In Proceedings of the SIGCHI Conference on
Rebecca M. Quintana, Stephanie R. Haley, Adam Levick, Caitlin Holman, Ben
Hayward, and Mike Wojan. 2017. The Persona Party: Using Personas to Design
on Human Factors in Computing Systems (CHI EA ’17). ACM, New York, NY, USA,
933–941. https://doi.org/10.1145/3072603.3053535
transnational class. Duke University Press.
Debaj Roy. 2006. Aspirations, poverty, and economic change. Understanding
Isha Ray and Renee Kuriyan. 2010. Towards aspiration as a development indica-
ACM, New York, NY, USA, 1301–1310.

Atul Chauhan. 2010. “May God Give Sons to All”. Towards Aspiration as a
development indicator for rural women in India. In Proceedings of the 8th
International Symposium on Wikis and Open Collaboration (WikiSym ’11). ACM,
New York, NY, USA, 1301–1310.

Ghazala Fatima and Mary Jane C Parmenter. 2005. The persistence of traditional
gender roles in the information technology sector: A study of female engineers in
Stephen Purpura, Victoria Schwanda, Kaiton Williams, William Stabler,
and Phoebe Sengers. 2011. Fitfile: the design of a persuasive technology promoting
healthy behavior and ideal weight. In Proceedings of the SIGCHI Conference on
Rebecca M. Quintana, Stephanie R. Haley, Adam Levick, Caitlin Holman, Ben
Hayward, and Mike Wojan. 2017. The Persona Party: Using Personas to Design
on Human Factors in Computing Systems (CHI EA ’17). ACM, New York, NY, USA,
933–941. https://doi.org/10.1145/3072603.3053535
transnational class. Duke University Press.
Debaj Ray. 2006. Aspirations, poverty, and economic change. Understanding
Isha Ray and Renee Kuriyan. 2010. Towards aspiration as a development indica-
ACM, New York, NY, USA, 1301–1310.

Atul Chauhan. 2010. “May God Give Sons to All”. Towards Aspiration as a
development indicator for rural women in India. In Proceedings of the 8th
International Symposium on Wikis and Open Collaboration (WikiSym ’11). ACM,
New York, NY, USA, 1301–1310.