

DreamGigs: Designing a Tool to Empower Low-resource Job Seekers

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ABSTRACT

Technology allows us to scale the number of jobs we search for and apply to, train for work, and earn money online. However, these technologies do not benefit all job seekers equally and must be designed to better support the needs of underserved job seekers. Research suggests that underserved job seekers prefer employment technologies that can support them in articulating their skills and experiences and in identifying pathways to achieve their career goals. Therefore, we present the design, implementation, and evaluation of DreamGigs, a tool that identifies the skills job seekers need to reach their dream jobs and presents volunteer and employment opportunities for them to acquire those skills. Our evaluation results show that DreamGigs aids in the process of personal empowerment. We contribute design implications for mitigating aspects of powerlessness that low-resource job seekers experience and discuss ways to promote action-taking in these job seekers.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**;

KEYWORDS

Employment, employability, low resource, job seekers, empowerment, agile development

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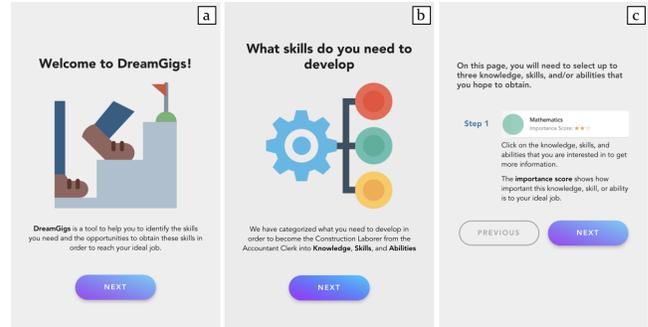


Figure 1: Final DreamGigs Design. a. Welcome screen; b. Tutorial Screen 1; c. Tutorial Screen 2

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1 INTRODUCTION

Stable work environments and lifelong employment at a single organization are no longer guaranteed. To stay competitive, workers need better training and retooling of existing skills. Researchers argue that the solution to helping individuals prosper and adapt to changing work environments is narrative career interventions [6, 7, 37, 43], which support job seekers in articulating their needs and goals [37]. However, low-resource job seekers are more vulnerable to these changing work environments because they are less likely to have access to resources for training and career development. They are also less likely to develop positive aspirations and career narratives than their counterparts with abundant access to resources [32]. We argue that today's employment tools should help low-resource job seekers develop the skills and pathways needed to meet their aspirations and improve their self-efficacy.

We built on prior HCI literature that contributed a set of ten tangible design concepts for future employment tools [11]. This work drew from past HCI investigations of underserved job seekers and contributed an analysis of the three most and three least popular concepts preferred by 11 underserved job seekers. We iteratively prototyped, extended the design of, and evaluated one of the top three concepts – DreamGigs. DreamGigs was conceptualized as a tool to help job seekers understand the career-related skills they would

need to reach their ideal job, or “dream” job [11]. The tool also provided a list of positions available that job seekers could pursue to acquire the specified skills, thereby supporting job seekers in seeing and developing pathways to reach their ideal careers. Because these tools already drew on existing research to support the needs of disadvantaged job seekers, we combined user-centered design with an agile development process to design, implement, and conduct evaluations of our prototyped version of the DreamGigs concept among disadvantaged job seekers (see Figure 1).

We conducted a series of 25 interviews with social workers and low-resource job seekers while iteratively designing and developing the tool. We discovered during a grounded-theory analysis of our interview and transcripts that themes from our evaluation fit the personal empowerment process [29]. Building on past research and the HCI empowerment framework [38], we contribute:

- The design, implementation, and evaluation of DreamGigs, a working system for low-resource job seekers to identify job and volunteer opportunities that are aligned with their career goals;
- An approach to apply and tailor agile development methodologies to a resource-scarce setting;
- An empirical understanding of barriers faced by low-resource job seekers that confirm prior research and a set of strategies to address these barriers; and,
- A set of concrete design implications for mitigating aspects of powerlessness that low-resource job seekers experience, which we apply to each stage of the personal empowerment process.

The results of our study and our user-centered design and agile implementation approach should enable future researchers, designers, and practitioners to build employment tools to empower low-resource job seekers.

2 BACKGROUND AND RELATED WORK

We contributed an extensive review of HCI investigations of underserved job seekers, the types of barriers they experience, and key design insights from these investigations in our previous work [11]. In this work, we found that low-resource job seekers require social support, feedback, and trust as well as support for personal needs such as the ability to articulate one’s current skills and advice on how these skills translate into career opportunities. We also identified a set of challenges that were societal in nature. These included limited access to transportation and limited support for wage theft and employee rights as per Dombrowski et al. [14]. As a next step, we conducted a speed-dating study of ten employment concepts inspired by our past HCI research of underserved job seekers [9] and others [14, 20–22, 44] to

understand which concepts were most viable among underserved job seekers.

We found from our speed dating study that our target job seekers preferred design concepts that could immediately address social and personal needs, such as getting resume feedback, help in articulating skills and past experiences, and assistance in identifying a path to achieve their career goals [11]. In addition to identifying key design insights, this work also found that very few tools had been implemented to address the needs of underserved job seekers. While one such tool, Review-Me, which aims to support job seekers in receiving resume feedback had already been implemented and evaluated among low-resource job seekers [9], very few, if any tools provided these job seekers with support to achieve their career goals. In this work, we aim to fill this gap by implementing and evaluating DreamGigs, one of the top-3-ranked tools in our speed dating study [11].

For low-resource job seekers to engage with employment platforms in-depth, one of three strategies proposed by past work was setting long-term career goals [44]. Setting long-term career goals includes suggesting career paths and identifying skill gaps. This has also been suggested for low-resource job seekers in prior work [24] and learners taking Massive Open Online Courses (MOOCs) [13]. These findings are also consistent with a meta-analytic review of job search interventions that found that interventions focused on skill development are more effective in promoting employment [28], which is the goal of micro-internships [42]. In addition, research shows that individuals must demonstrate proactive career behaviors to ensure their employability, and this requires that they prioritize long-term outcomes over short-term benefits [17]. Supporting job seekers’ ability to take control of their careers is vital, especially in the changing nature of work. This support can be provided by aiding job seekers in the development of their own career pathways. Thus, our work contributes an employment tool to support both short-term and long-term aspects for job seekers from low-resource areas and who are underserved.

3 THE INITIAL DESIGN OF DREAMGIGS

We discussed the technical details of the initial front- and back-end implementation of DreamGigs in our Late-Breaking Work [30]. The initial design was based heavily on the DreamGigs description in past work: “the tool specifies: (1) the skills the job seeker would need to develop to achieve his or her ideal job and (2) available positions that job seekers could pursue to acquire these skills” [11, p.37]. We adopted a range of methods including qualitative interviews and iterative tool development, and we involved both social workers and job seekers in our evaluation.

We pursued a minimalist design to consider the needs of underserved job seekers per suggestions from past research

[9]. For this reason, we did not require system login. Past research also expressed the importance of employment tools being accessible via mobile phones [9, 39]. As such, we used the Ionic framework so that DreamGigs was usable from multiple platforms. The initial front-end system consisted of three main pages: (1) *Home page*, (2) *Identified skills page*, and (3) *Gigs page*. For context, these pages can be found in Figure 3a, 3b and 3d. Compared to Figure 3a, the initial *Home page* did not ask for a desired location because the location was hard-coded to a specific location. As discussed later, the initial *Gigs page* presented jobs from Craigslist instead of Indeed.com. Overall, on the *Home page*, users input the titles of their most recent job and dream job. On the *Identified skills page*, users could see a list of skills, in the order of relevance, that they needed to develop to reach their dream job. Users could select up to three skills they desired to obtain. After users confirmed the skills they hoped to develop, they were sent to the *Gigs page* where they were presented with a list of Craigslist jobs, or gigs, to help them to develop the skills needed to reach their dream job.

We used the Python Flask framework to build the back-end web server. The initial back-end had two key responsibilities: (1) identifying skills that job seekers needed to reach their dream job, which we implemented using DataAtWork¹ and O*NET² APIs, and (2) presenting available jobs to prepare job seekers with the skills needed for their dream job, which we accomplished by scraping postings for gigs on Craigslist.

4 RECRUITMENT AND METHODS

Following the recruiting methods used in prior work of underserved job seekers [9, 11, 44], we recruited from non-profit organizations that supported our target job seeker needs, and we also recruited job seekers from our past study participants. We conducted evaluation sessions and semi-structured interviews with job seekers at locations convenient to them, including cafes, restaurants, and community centers. We also incorporated snowball sampling and asked participants to refer others to our study. Our study was approved by our institutional review board (IRB), and we received informed consent from each participant.

Among 15 of our low-resource job seeker participants (see Table 1 for details), the majority identified as African American (N = 12), while the rest identified as Caucasian (N = 2) and Native American (N = 1). The mean age of our participants was 42.5 (sd = 12.6). Most of our participants (N = 12) were looking for a full-time position, had a high school diploma or less (N = 9), and reported an annual income of less than \$15,000 (N = 10). In addition, two job seekers were

homeless, four reported having a disability, and three were formerly incarcerated.

Iterative Development and Evaluation

We followed an iterative development process, a key practice in agile development methodologies for tool implementation [5]. This incremental, iterative approach, visualized in Figure 2, enabled us to quickly deliver a working prototype with continuous improvement based on interview feedback. We conducted three design sprints that included design, development, and evaluation. We conducted interview sessions at the end of each sprint with social workers and our target job seekers for feedback on each version of our prototype. One-on-one interview sessions lasted 40–80 minutes.

Sprint 1. We implemented the DreamGigs concept as described in [11]. These researchers began their design process by conducting needs validation sessions to obtain initial design requirements and feedback from job seekers. Building on past HCI literature, they created ten storyboards to provide job seekers with a high-level view of their tools and made them publicly available. Therefore, we used the storyboard that corresponded to DreamGigs [12] as a starting point to design and develop a minimum viable product (MVP) [34] of this tool. Sprint 1, discussed in section 3, spanned 1 month. Because the researchers in this previous work [11] noted the need for external stakeholder feedback for their concepts, we ran a small-scale usability test with five social workers to evaluate the efficiency and effectiveness of the initial prototype. All these participants had previously worked with local underserved communities and were knowledgeable of the targeted populations' challenges and needs.

Before starting our usability test, we presented our participants with the DreamGigs storyboard used in [11] to give them a basic overview of the tool. We asked each participant to use the tool based on their knowledge and personal experiences as it related to career transitions and their engagement with low-resource populations. We provided participants with minimal instruction on how to use the tool. We asked them to think aloud, to describe their feelings, and to ask questions when using the tool. After participants experienced using the application, we held a debriefing session. We asked them to describe their overall experience navigating the tool and the objective that they thought the tool was intended to achieve. We then asked participants to tell us whether the identified skills and gigs presented made sense. Finally, we invited social work participants to describe additional information and opportunities that would be beneficial for underserved job seekers.

Sprint 2. Sprint 2 spanned 2 months and included feedback from Sprint 1 and its evaluation. We conducted ten semi-structured interviews (N = 7 women) with low-resource job

¹<https://api.dataatwork.org>

²<https://www.onetonline.org/>

ID*	Pseudonym	Age	Race	Gender	Most Recent Job	Dream Job	Sprint 2	Sprint 3
P1	Shelly	46	AA	F	Customer service representative	Marketing analyst	✓	✓
P2	Doris	29	AA	F	Manufacturing production technician	Agent and business manager	✓	✓
P3	Karla	45	AA	F	Janitor	Nursing midwife	✓	
P4	Patsy	48	AA	F	Floral designer	Salesman/owner	✓	✓
P5	Judy	55	AA	F	Floral designer	Business owner	✓	✓
P6	Caleb	45	NA	M	Packer and packager	Funeral service manager	✓	
P7	Trevon	65	AA	M	Paralegal and legal assistant	Industrial-organizational psychologist	✓	
P8	Reginald	49	AA	M	Air traffic controller	Correctional officer	✓	✓
P9	Kimberly	29	AA	F	Massage therapist	Dancer	✓	
P10	Jasmine	55	AA	F	Healthcare support worker	Elementary school teacher	✓	
P11	Dawn	29	AA	F	Manufacturing production technician	Business owner		✓
P12	Leon	53	AA	M	Line worker	Salesman/owner		✓
P13	Tyrone	40	AA	M	Clinical support specialist	Neurological surgeon		✓
P14	Bob	29	C	M	Carpenter/laborer	Journalist		✓
P15	Nick	21	C	M	Landscape gardener	Restaurant owner		✓

*Note: Five social worker participants of Sprint 1 are excluded in this table; AA – African American, NA – Native American, C – Caucasian

Table 1: Participant Demographics and their Most Recent and Dream Jobs

seekers (see Table 1 for details). We began the evaluation session by interviewing participants about their experiences, frustrations, and concerns relating to the online job search, career history, and career transitions. Next, we conducted usability tests like in Sprint 1. We conducted debriefing sessions after participants experienced using the tool. We asked participants to give feedback on the opportunities that were provided for their job search and asked them to discuss additional thoughts about the tool.

Sprint 3. Sprint 3 spanned 2 months and included feedback from Sprint 2 and the final evaluation. We contacted our past participants for interviews and were able to reach five job seekers from Sprint 2 (N = 4 women) (see Table 1 for details). We recruited five new job seekers (N = 1 woman). We followed the same evaluation process as Sprint 2 for new participants; we focused on whether our Sprint 3 updates addressed the needs of the returning job seekers from Sprint 2. We asked returning job seekers about their thoughts on the updated version of the tool compared to the old version. Finally, we asked them to comment on the incorporated changes based on their earlier feedback. We wanted to understand whether their feedback had been incorporated and obtain any additional feedback.

Analysis

All interviews and evaluation sessions were audio-recorded, professionally transcribed, and supplemented with field notes. We conducted initial coding of field notes and transcripts of earlier rounds of interviews using grounded theory analysis [16]. We searched for common themes that participants used to describe their experiences, frustrations, concerns, and challenges they faced in the job process, and their overall experience using DreamGigs. Both authors reviewed the transcripts and memorandums and held iterative discussions of the results. Initial themes included: “barriers” such

as social isolation and limited tech literacy, “opportunities” such as social connections and employment resources, “self-efficacy”, and “dream jobs.” After several discussions of the transcripts, we saw that the codes that resulted were well aligned with attributes from the process of personal empowerment [29]. After discussing this further, we applied second-level codes to our data following a more focused approach. We used Lord and Hutchison’s five main stages corresponding to the personal empowerment process [29] to inform our a priori codes. These included “experiencing powerlessness,” “gaining awareness,” “learning new roles,” “initiating participation,” and “contributing”. We applied another iteration of coding to fully understand what aspects of design led to our participants’ feelings of empowerment.

5 THE EVOLUTION OF DREAMGIGS

In this section, we discuss the evolution of DreamGigs based on participant feedback from each sprint. We present key themes from our data and describe how we addressed job seeker feedback. To summarize the key takeaways from our evaluations (see Figure 2), Sprint 1 revealed the importance of finding the right gigs in terms of practicality, reliability, and flexibility on the behalf of our participants. We learned from Sprint 2 to better categorize skills for job seekers and to accommodate job seekers with low digital literacy with a simpler interface. Sprint 3 included the final evaluation of our tool, which uncovered how DreamGigs became a tool to empower our job seekers.

Sprint 1: Finding the Right Gigs

In Sprint 1, we learned the importance of finding the right gigs in terms of practicality, reliability, and flexibility on the behalf of our participants. In our initial design, we recommended gigs posted on Craigslist. Recall that we sought feedback in our first sprint from five social workers.

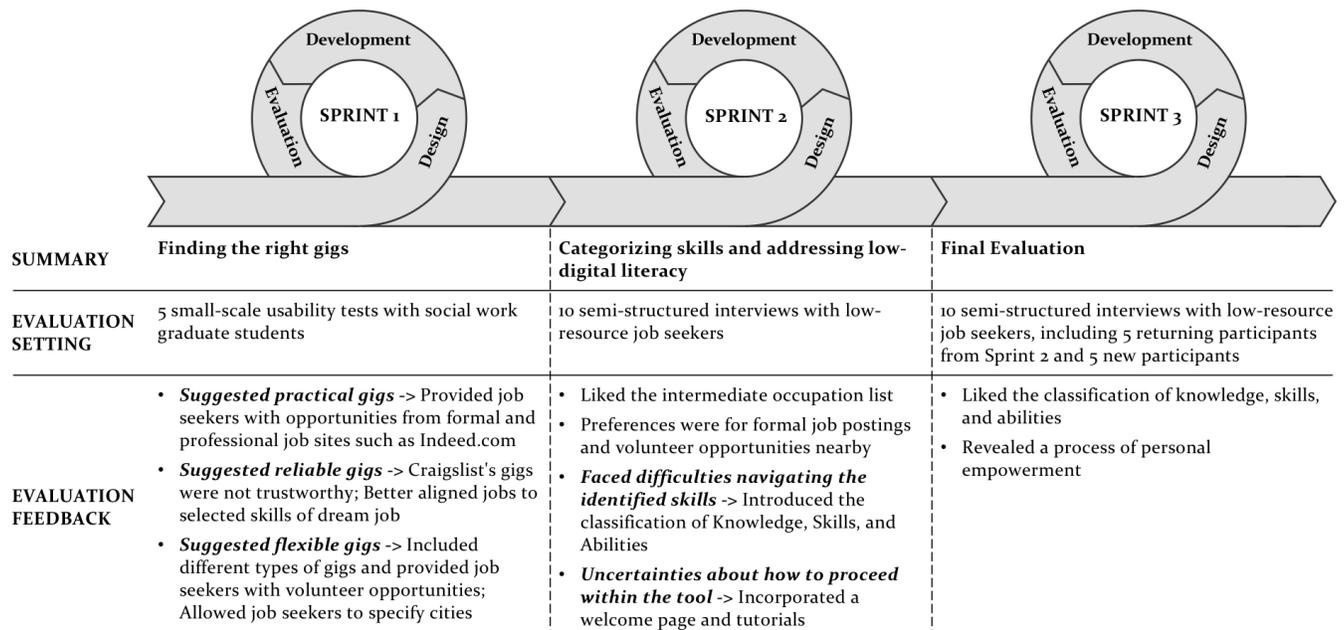


Figure 2: Iterative development and evaluation results: This figure summarizes the result of each sprint; the evaluation setting; and feedback received and/or updates made as a result of the feedback.

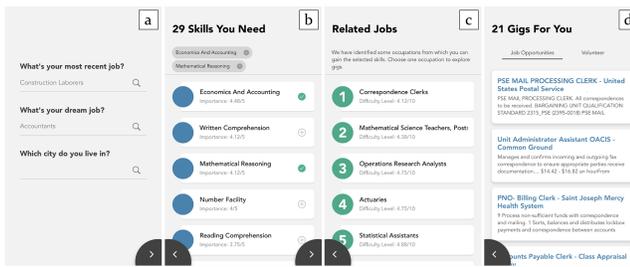


Figure 3: SPRINT 2 – a. Home page; b. Identified Skills; c. Intermediate occupations; d. Recommended gigs

All social worker participants (N = 5) described Craigslist's gigs as untrustworthy. Social worker participants also indicated that the gigs were inappropriate and not aligned with the skills that job seekers needed to develop for the specified dream job. For example, one participant selected “health care worker,” as a dream job and one of the recommended gigs resulted in “lady for a bachelor party.” Furthermore, other participants noticed that the number of job opportunities from Craigslist was limited and could not cover the various skills needed by the job seekers. This limitation also existed because we did not provide a way for job seekers to specify their geographic locations. Based on their past experience of engaging with low-resource communities, our social work participants expected job seekers to obtain skills through more formal and professional job sites such as Indeed.com, a site that allows users to search a large database of formal job postings and apply directly.

Social work participants also expressed the need for different types of gigs and for more opportunities for job seekers. Four out of five participants recommended that we add volunteer opportunities as a type of “gig.” Compared to formal employment, volunteering and community service opportunities do not require a long-term commitment and are efficient ways for job seekers with limited experiences to gain skills, develop their portfolios, and expand their network. In addition, a past study has shown that volunteering is associated with 27% higher odds of employment and is especially beneficial for individuals without a high school diploma or equivalent [41].

Sprint 2: Categorizing Skills and Addressing Low-Digital Literacy

In Sprint 1, our social worker participants commented that the recommended gigs were not explicitly aligned with the skills job seekers selected to develop. To improve the connection between the selected skills and the recommended gigs and narrow the gigs to fit the job seekers’ dream jobs, we provided users with a list of *intermediate occupations* after users selected up to three skills to develop. We took the three selected skills and introduced a new page to the front-end (see Figure 3c) and a new task to the backend server: identifying intermediate occupations based on the selected skills. The intermediate occupations were generated by analyzing the related jobs of each selected skills via the DataAtWork API. We sorted all the related jobs based on their total relevance score to the selected skills and presented job seekers

with the top 10 most related occupation titles. This enabled job seekers to select the occupation title of their interest and explore the gigs related to the selected occupation.

In the evaluation, our job seekers thought that pursuing intermediate jobs was a great way to develop the skills needed to prepare for their dream job. Trevon described the intermediate occupations as “building blocks to acquire skills along the way.” Shelly said that the intermediate occupations helped her narrow down her choices.

Recall that our social worker participants indicated that Craigslist jobs were often unreliable and potentially unsafe. We addressed this feedback by updating the back-end system to scrape formal entry-level job postings from Indeed.com and volunteer opportunities from VolunteerMatch.org. We also updated the *Home Page* to allow users to specify their current city (see Figure 3a) and the *Gigs Page* to reflect both job and volunteer opportunities (see Figure 3d).

After evaluating the implementation updates, our Sprint 2 job seekers (1) had preferences for formal job postings and volunteer opportunities, especially nearby; (2) had some difficulties navigating the identified skills; and (3) experienced some uncertainties about how to proceed within the tool. Overall, however, job seekers had a positive response to the tool. Job seekers were especially excited that the tool provided a link for them to directly apply to the jobs on Indeed.com:

[The actual jobs] made it a whole lot easier. So the next step after that was just filling out an application and seeing if I could actually get down and get a face to face with whoever does the hiring. You make the final step come quicker that way. – Reginald

Nine out ten of our participants in Sprint 2 reported that they liked the ability to view volunteer opportunities. They considered it a great way to obtain necessary employment skills even if they were mostly unpaid.

Especially in the beginning, because the fact is, is that, when there's nothing involved, you don't have anything to lose or anything; you don't have anything to lose, all you have to do is gain. You gain knowledge and you gain the opportunity to work with people and not expect anything more than it. When you don't expect anything [in return] it means you're doing it from your heart. You're really trying to learn. – Karla

In fact, two job seekers, unprompted, discussed their previous job search experience on Craigslist, which they described as being unreliable and confirmed our social worker participants' feedback:

Craigslist, anybody can post on there. Craigslist isn't as trustworthy. I used to look on Craigslist

a lot. I have found a few good jobs on there, but most of them are just scams or whatever. They're not real jobs. – Bob

While our job seekers liked providing their current city, two of them expressed transportation constraints and the need for opportunities *nearby*. Judy felt that the results would be more beneficial if “there was some jobs that were closer” if we could show opportunities in specific areas.

In terms of additional feedback, three participants (N = 3) found it hard to navigate the identified skills. They suggested categorizing the identified skills based on difficulty levels and to break them down into multiple types. Although most of our job seekers did not face navigation difficulties when using DreamGigs, two participants (N = 2) suggested the need for a navigation tutorial:

That's what you would probably need is to provide an orientation for the person that's going to use it. Right now it was a little clumsy for me ... because I didn't have any expectations [about] what was going to go on. – Trevon

Sprint 3: Final Evaluation

To accommodate the difficulties participants faced navigating the identified skills, we categorized the identified skills into knowledge, skills, and abilities (KSAs) based on the O*NET classifications [36]. *Knowledge* refers to the possession of both factual and procedural information needed to perform a task or job. Knowledge is normally obtained through formal education, on-the-job training, and information media. *Skills* represents a person's proficiency or competency level to perform a task or job and consist of basic and cross-functional skills. Basic skills consist of content skills such as mathematics and reading; process skills represent how individuals work with information to facilitate learning and can contribute to a faster acquisition of knowledge and skills. Cross-functional skills facilitate performance across different job contexts and are developed capabilities. They consist of social skills, problem-solving skills, technical skills, systems skills, and resource management skills and are specifically valuable when identifying the types of training that may be needed to meet job requirements. Finally, *abilities* are relatively stable and needed to perform a wide range of tasks; abilities can develop with experience and develop over time. We color-coded knowledge, skills, and abilities to help users differentiate the categories (see Figure 4b, 4c, and 4d). We also updated the most recent job and dream job search function on the *Home page*, so that users could select their preferred job title from a greater variety of available occupation names (see Figure 4a).

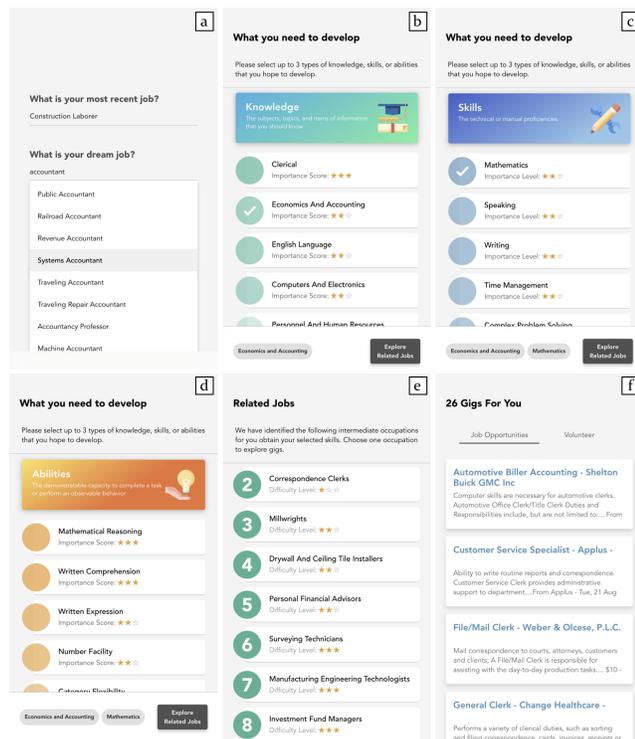


Figure 4: Sprint 3 – a. Home page; b. KSA classification: Knowledge; c. KSA classification: Skills; d. KSA classification: Abilities; e. Intermediate occupations; f. Recommended gigs

In addition, we redesigned the front-end of the system based on job seeker feedback and included a tutorial to accommodate varying levels of digital literacy. We added a *Welcome and tutorial screen* to each page, which presented instructions for how to use the tool (see Figure 1). We also updated the *Home Page* to accept ZIP code instead of city name to more accurately provide nearby job and volunteer opportunities.

Our final evaluation revealed that job seekers liked the new classification of knowledge, skills, and abilities. Compared to the original unsorted list of identified skills, job seekers indicated that such classification enabled them to better understand the information presented. At the same time, job seekers were able to have a clearer picture of what qualities employers required and concrete ways to focus their training. However, as we discuss in the next section, the analysis of Sprint 3 also revealed a *process of personal empowerment* as a result of job seekers using of the tool.

6 PROCESS OF PERSONAL EMPOWERMENT

In this section, we describe the process of personal empowerment, which we later use to organize our results. Empowerment is about gaining power [19, 33, 40]. No consensus of the

definition of power has been reached in the social and political literature [31]. In this study, however, we refer to Arendt’s definition of power as “something – anything – which makes or renders somebody able to do, capable of doing something. Power is capacity, potential, ability, or wherewithal” [3, p.8].

According to Lord and Hutchison, personal empowerment processes are those where individuals create or are given opportunities to exert control of their destiny and decisions that impact their lives [45]. The empowerment process consists of five stages: *experiencing powerlessness, gaining awareness, learning new roles, initiating participation, and contributing* [29].

The first stage of the personal empowerment process is *experiencing powerlessness*. Whereas power refers to one’s capacity, potential, and ability to do something and is embedded in social relationships, experiencing powerlessness is the opposite [8]. Powerlessness is associated with one’s limited capacity and barriers to achieve goals and one’s limited influence at various levels of social interactions.

Gaining awareness, the second stage, is the impetus to the empowerment process. Kieffer defined critical awareness as one’s knowledge of the information that helps the person to achieve his or her goal, as well as the knowledge about the appropriate resources [26]. In this stage, individuals begin to have a better understanding of their strengths and capacities, as well as the alternatives to their feelings of powerlessness. More important, individuals become aware of and begin to consider new directions for their lives in this stage [29], thereby corresponding to pathways and narratives to their careers. The third stage of the empowerment process, *learning new roles*, is the stage where individuals begin to gain *access* to valued resources. Having access to resources so that individuals can develop a sense of control over their own environment is a critical component of the empowerment process [45].

The fourth stage, *initiating participation*, significantly advances the personal empowerment process because participation itself is considered empowering [26, 29]. Individuals must take action to utilize their resources, reach their goal, and be able to exert influence. The action is informed by the prior stages of the empowerment process. In particular, Cattaneo and Chapman pointed out that action is: driven by specific goals; motivated by the personal value of those goals and beliefs about one’s ability to reach goals; informed by relevant knowledge, and carried out by using relevant skills [8]. Similarly, Freire wrote that participation is generated by one’s perception of his or her own situation [15]. At this stage, individuals began to engage in various activities, as well as social groups or actions, that allow them to benefit from social interactions and thus reduce their social isolation.

Contributing is the final stage of the personal empowerment process. At this stage, individuals find ways and opportunities to contribute to their communities and exert influence, which increases individuals' self-efficacy, feelings of value, and sense of control [27].

7 RESULTS

We first describe the factors contributing to our participants' powerlessness in the job search process. For the remaining four stages, we describe how the evolution of DreamGigs helped to address each factor contributing to this powerlessness.

Experiencing Powerlessness

During our evaluation sessions, job seeker participants described barriers and challenges they faced in their job search and career development process, which we identified as *experiencing powerlessness*. We asked job seekers to describe what their dream jobs looked like and their approach to reaching their dream job. Every participant expressed having a rough idea of their career aspirations but described various obstacles they faced in achieving their goals. Our data showed that job seekers experienced powerlessness in their job search and career development process mainly as a result of (1) limited employment choices, (2) untrustworthy hiring information, (3) social isolation resulting from limited transportation, and (4) limited digital literacy.

Limited Employment Choices. One of the most salient challenges our job seekers experienced was limited employment choices from various factors. Some job seekers pointed out that their neighborhoods did not provide many employment opportunities. For example, Dawn felt restricted by the services she received from the local employment service organizations, which had limited her to jobs related to production, retail, and nearby fast food restaurants.

We found through our job seekers experiences that one's personal situation, such as disability, felony history, illness, and homelessness, can significantly impact one's employment options. Four of our participants reported having a disability and were constrained to working a certain number of hours and receiving a certain salary to maintain their federal social security benefits [2]. As reported in previous work [9, 11, 20–22, 44], the employment choices these job seekers have are largely restricted.

Untrustworthy Hiring Information. Our job seekers identified one of their greatest challenges as finding reliable job sources. They found it hard to (1) differentiate between reliable job search websites and phishing websites, (2) find accurate employer information, and (3) manage "junk" information. Trevon complained that he had experienced 2 or 3 days searching on job search websites and eventually

realized that all the postings were invalid. Judy also found it hard to identify trustworthy job search websites.

Social Isolation. In addition to limited employment choices, another salient barrier to job search and access to job opportunities was the lack of transportation access. Job seekers in our study felt a deep sense of social isolation primarily due to limited public transportation. Studies have shown that limited public transportation contributes to the social isolation of individuals and leads to poor job prospects [25]. This was consistently the most salient job search barrier among many ($N = 7$) of our job seekers. As such, job seekers were unable to take jobs without access to a public bus route. The operation times of public transportation also served as a barrier because they often did not match job seekers' working hours.

In addition to limiting job seekers' job choices, having limited access to public transportation also made it difficult for job seekers to attend job interviews and access career services from community employment organizations.

Technology Literacy. Because of a lack of education and exposure to information technology, more than half of our underserved job seekers ($N = 8$) acknowledged that they had limited knowledge of using computers and other digital devices. These job seekers also expressed their desire to gain more computer-related skill training.

Interestingly, these eight participants were older than 45 years, and some of them acknowledged that age was a barrier for them in terms of familiarizing themselves with day-to-day technology use. This corresponds to past research showing that low-income older adults have much lower rates of Internet use compared to younger U.S. adults [23]. For example, Judy, a 55-year-old, described that the older generation did not "come up with computers," which put them at a disadvantage.

Gaining Awareness

We found that overall, our participants understood the concept of DreamGigs fairly well. DreamGigs provided job seekers with the information they needed to gain awareness and more knowledge about the skills they had and the skills and training they needed for their dream job.

Identification of required skills: All of our job seekers indicated that the identified skills accurately portrayed what they needed to reach their career goals. Most of them responded positively when seeing skills identified. They were able to interpret and validate these skills based on their understanding of their dream job.

I looked at all those skills you need, mathematics, all that management, everything. I was like, "Yeah, you need that..." And I was like, "Yup, I can get

stronger in that.” People [need] resources, learning how to do this a little bit better. So you can be effective in getting your jobs done. – Judy

Furthermore, gaining and responding to new information can encourage individuals to get on with their lives and can begin to make contributions to the empowerment process [29]. Some job seekers expressed that the information of identified skills helped them to understand what employers are looking for.

Identifying the skills, that’s what you need to acquire ... your dream job. So you must first be able to identify then attain the skills that’s needed for you to capture your dream job. – Reginald

[The identified skills] give you exactly what skills that [employers] are looking for you to give. Personally, I think it’d help because if you’re lacking you can go get some training in those areas to help you, ... especially if you know that’s what the employers are looking for. – Patsy

As a result, job seekers began to consider taking initiatives to obtain the skills that they were lacking. For example, Bob explained that the identified skills enabled him to prioritize his next steps.

I think that there’s certain knowledge, skills, and abilities that I didn’t know that I was going to have to have, that I know now I have to have, that I can start working on now. Or skills that I didn’t know were as important as they are. – Bob

Learning New Roles

In support of *learning new roles*, DreamGigs helped job seekers expand their outlook. By displaying jobs available via Indeed.com and VolunteerMatch.org, DreamGigs allowed job seekers to expand their choices and opportunities. These resources and opportunities also allowed job seekers to connect to a wider community and served as a pathway for job seekers to identify possible routes to attain their goals.

Knowledge of Intermediate Occupations: By identifying multiple intermediate occupations, DreamGigs enabled job seekers to have a variety of routes to goal attainment. Some participants told us that they had never thought about working in certain occupations until they saw this feature.

It just gave you so many different opportunities. I’m thinking I can just sell clothes and that but it’s houses and cars and boats and you can be manager of the stuff. I never expanded my horizon that long. Never thought of it. – Leon

In Dawn’s case, she was a manufacturing production technician and she looked forward to becoming a business owner. She was surprised to see occupations such as “travel agent”

and “lodging manager” in her list of intermediate occupations. After seeing this list, she selected customer and personal service, mathematics, and fluency of ideas as the desired skills she wished to develop. DreamGigs provided her with employment options that were different from the retail and manufacturing information she received from the local employment agencies. She believed that these options expanded her mind in terms of the job search:

*You just never know what you can do because people are good at a lot of things but if you don’t have the resources and just even a mindset, then you just will never know. You’ll never get to it. But when you have stuff like this, **it kind of expands your mind and your thought process** so that you can reach out more. **You don’t have to feel stuck** in what you’re surrounded by.* – Dawn

Some participants found that the intermediate jobs and identified gigs helped them to think about their passions. Tyrone said that the intermediate occupations he saw “**gave him hope**” and made him realize “what he really wants”.

Flexibility of Gigs: We found that most of our job seekers (N = 11) spent more time browsing the volunteer postings. Many job seekers (N = 12) expressed liking the idea of helping people and contributing back to their community. Compared to formal jobs, job seekers considered volunteering to be a great opportunity to try various types of work and gain some hands-on experience. Doris was currently a manufacturing production technician, and she hoped to gain some economics and accounting related skills so that she could become a business manager. She had never realized the opportunities to develop economic skills through volunteering with small community businesses.

*This actually **inspires me**, because I actually see some, instead of the job opportunities, I kind of like volunteering. Because I feel like when you volunteer you actually get a feel for what you want to do or what you are gonna do. Versus going into a job, you get comfortable, and you kind of content and you kind of just lose focus of why you are there. Volunteering, you’re actually hands-on, I know when I volunteer, I’m more hands-on.* – Doris

Job seekers noted that volunteering benefited them by helping to build their social network. Past work finds that this is particularly important for low job seekers in terms of landing jobs [44].

*That with me becoming a volunteer, it would **put me in the network of meeting people** that can help me along the way whether it’s advice, or **putting in a good word for my efforts.*** – Karla

Practicality and Reliability of Gigs: Job seekers believed that the direct link to jobs via Indeed.com was valuable. Four of our job seekers explicitly pointed out that they liked being able to send out the application right away on DreamGigs, saying that this allowed them to have better control of their job search process.

What I like about it is, it gives you specifically the actual jobs that's hiring right now. And you can click on it, and you can either apply, or you can volunteer. ... There's no website out there where you can do that, even with the website of [local organization redacted for anonymity], or Facebook, anything. So that's what I like about it. – Shelly

Initiating Participation

In the first three stages of the empowerment process, DreamGigs allowed job seekers to identify a clearer pathway to reach their ideal job and provided them with employment opportunities. Our data showed that having this knowledge encouraged job seekers to initiate further actions. Specifically, enabling access to local resources also addressed job seekers' social isolation challenges, caused by their limited transportation options and provided them with clearer direction.

Access to Local Resources: Recall that one of the main factors that resulted in job seekers' limited employment choices was that job seekers felt their neighborhood could not provide them with enough job resources. People didn't know where to find jobs or were not aware of jobs available. As such, the DreamGigs' feature that allowed job seekers to pinpoint their ZIP code enabled job seekers to gain access to employment resources nearest to them.

*You know you always hear people complaining there are no jobs. There are. **It gives me motivation.** ... In terms of motivation to search for a job, or motivation to develop your skills, or develop my skills, get myself together, keep working on my goals, because they have different jobs in the area and volunteer. So they have a lot of resources in different fields. – Patsy*

Clearer Direction: Doris said that DreamGigs encouraged her to further research her dream job to become a manager in the social media field. Similarly, Shelly said that DreamGigs helped her to identify a clearer direction:

*[DreamGigs gave me a better] understanding [of] my dream job and what I really need to know, what specific knowledge, skills, and abilities that I need to know. ... **It opened my eyes on more things that I can learn,** hopefully through my mentor or on my own research and gaining knowledge from it. – Shelly*

Based on the new context, some participants began to create a detailed plan for their future actions. For example, Patsy's dream job was to become a business owner. She realized while using DreamGigs that she should work on her writing skills to develop better business proposals and get funding. As a result, she planned to find trainings to improve her writing skills and sign up for volunteer opportunities related to grant writing:

I felt like there was enough information for me to look forward to this week, to setting some new goals. Like I said, registering for school, some computer classes. ... Maybe I need to go take a writing class or something in the next couple weeks. ... And I'm going to find some way that I can volunteer a couple of days a week. Just for some interaction with some new faces, and getting people skills, and volunteering. 'Cause I do have some time. – Patsy

Contributing

Our user-centered design approach combined with an agile development process allowed our participants to engage and therefore contribute throughout the design process. Participants proposed new features and evaluated each design update; participants also volunteered to share DreamGigs with their communities, thereby working to have influence on them. Many participants expressed their appreciation for this opportunity. Most of our job seekers (N = 14) contributed some level of feedback. Bob described contributing to the design and evaluation as a "cool and unexpected" experience:

I didn't think it was going to be like this, but it was cool to have a hands-on experience with it and give some input on what I think would be good and what would not be good. It made me feel important, like what I have to say means something. That's how I feel. I feel like my opinion matters. – Bob

Furthermore, most of the participants (N = 11) said they felt positive about participating in the study and being exposed to resources like DreamGigs. For example, Leon who was formerly incarcerated and is a returning citizen, thought that his feedback would "help a lot of people out in the near future, especially help those who get out jail and try to get felon-friendly jobs." He expressed feeling independence in the job search process as a result of using DreamGigs:

*I can go to [DreamGigs] and **find out what I'm looking for to better myself.** I feel great about it. I ain't gotta ask nobody. I can look up the stuff myself and just try to achieve. – Leon*

Most of our low-resource job seekers (N = 12) expressed that they would either continue using DreamGigs offline or take further action on their job search. About half of our job seekers (N = 7) thought that DreamGigs should be

more widely available. They wanted people who were facing similar problems to have support for their job search and career development.

8 DISCUSSION

Our findings both confirm and extend prior work. The barriers and challenges that contributed to our job seekers' powerlessness in the job search were not unlike the barriers that have been identified among past research in HCI and other areas [9, 11, 18, 20–22, 24, 44]. However, our agile, user-centered approach to designing DreamGigs and incorporating job seeker feedback, resulted in the mitigation of many of these barriers and challenges. Therefore, we discuss three concrete design implications that we found capable of empowering low-resource job seekers and one design implication that we believe to be feasible to further empower our job seekers in the future. Figure 5 illustrates the key features that were informed by our participant feedback, thereby contributing to the process of empowerment. We conclude by integrating our findings into the HCI empowerment framework and discussing how this framework was beneficial in validating our future work.

Design Implications

Figure 5 outlines the key study takeaways, which we discuss as design implications, that correspond to each stage of the personal empowerment process. Providing job seekers with new information and direct access to resources, initiating participation by promoting actions, and engaging users in the design process are all known impetus for empowerment [29] and all contributed to the stages of empowerment in our study. However, future iterations will need to promote ways for job seekers to take action to pursue their goals.

Providing New Information and Direct Access to Resources. Recall that our job seekers faced limited employment choices. Researchers have found that providing new information for individuals to respond to is an impetus for change [29] and can help to expand one's choices. DreamGigs provided new information that supported job seekers' personal needs. It did so by (1) helping job seekers identify the skills they needed to land their dream job; (2) identifying the knowledges, skills, and abilities they needed to increase their qualifications; (3) identifying the intermediate occupations job seekers needed to develop these skills; and (4) providing job seekers with direct access to resources and opportunities.

After getting this new information, participants described feeling inspired, motivated, hopeful, and opportunistic. DreamGigs also mitigated job seekers' feelings of powerlessness that stemmed from social isolation. DreamGigs presented job

seekers with multiple opportunities to access needed resources and did so by identifying job and volunteer opportunities *nearby*. This made job seekers see that their goals were both feasible and accomplishable, which elevated their feelings of self-efficacy and control over their career development.

Initiating Participation by Promoting Actions. While providing new information to respond to is an impetus for change, it does not always guarantee action. Our results suggest that our job seekers began to *initiate* participation. This was strongly supported by DreamGigs' ability to identify a clearer pathway for job seekers to reach their ideal jobs. Further, our participants expressed a desire for continued use of the tool. However, we believe that more engagement and accountability could promote even further action among job seekers. To build from prior work that found that low-resource job seekers only *landed* jobs through their social networks [44], we suggest connecting job seekers to individuals in their networks who have ties to the intermediate jobs shown and to the volunteer opportunities available. Many of our participants used their nearby employment agencies when they could access them. Connecting DreamGigs to these agencies could enable job seekers to send their results to the agencies as an accountability measure if desired. Perhaps this would increase the likelihood that our job seekers would take action as a result of using the application. Further, this identifies a social-technical gap [1] between the social needs of our job seekers (e.g., applying to the job opportunities available, attending necessary trainings), and what is possible with DreamGigs. We confirm that motivation is a challenging need to address via technology and should be supplemented with social support, which has been identified in past work [10].

Engaging Participants in the Design Process. While our initial design and agile approach was derived from employment concepts that were vetted by low-resource job seekers from recent HCI work [11, 12], our design and implementation approach enabled job seekers to become active participants and central to the design process. Both the process of participation and putting users at the center of design can be empowering because they help individuals gain self-confidence, reduce isolation by increasing social interaction, and enable them to contribute and see the benefits of their contributions [4, 29]. In addition, our interviews took place in a neutral places, or "third spaces," that enabled us as designers and researchers and job seekers to create new ideas and learn reciprocally [35]. The act of engaging participants in design led to our participants' increasing self-efficacy while seeing and experiencing their contributions. According to Schneider et al., "technology can only be empowering when designed from the empoweree's perspective" [38, p. 244:4].

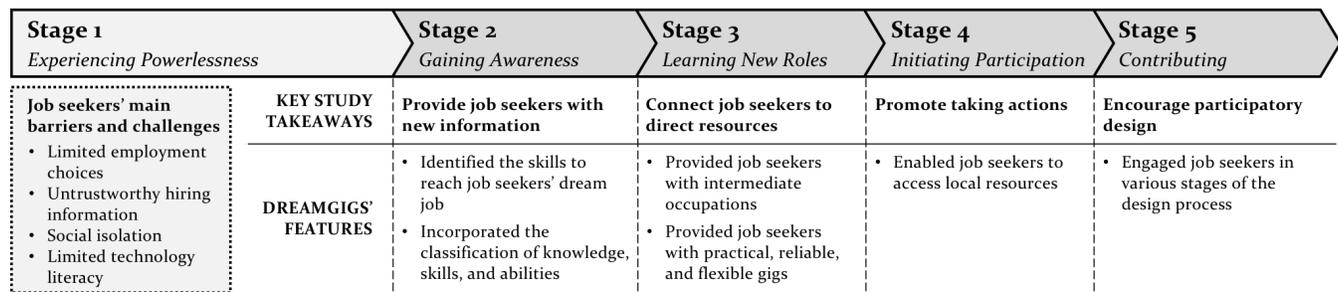


Figure 5: The process of personal empowerment

The HCI Empowerment Framework

Schneider et al. [38] contributed a framework to add structure and terminological clarity to HCI empowerment literature. This framework consists of four distinct notions of power, which are referred to as categories (concept of power, psychological component, persistence of empowerment, and design mindset), and eight lines of research (empowering experiences, skills and education, self-enhancement, holistic approaches, empowerment through design process, technology for development, protective technology, and community empowerment) that have been represented by past HCI empowerment work. As discussed in the previous sections, our analysis showed that DreamGigs provided our job seekers with a sense of empowerment through using the system itself and engaging in and contributing to the design process of the system.

In this section, we (1) validate the framework's categories and lines of research by mapping our work to the framework, and (2) demonstrate and clarify that a single work can cover multiple lines of research, which was not explicitly clarified in the original framework.

Framework Categories: We found both concepts of *power-to* and *power-over* to be appropriate for our work. Because our system aims to enable people to reach their dream jobs, the *power-to* concept was most appropriate. Because we aim to support a marginalized group, DreamGigs also fit the *power-over* category. Second, DreamGigs as a system focuses on the psychological components *knowing* and *feeling*. Our data showed that the design of DreamGigs provides job seekers with knowledge and a pathway to achieve their career goals. Through interacting with the tool and participating in the design process, job seekers were more motivated to exert control over their job search and development. What we found to be beneficial about the framework was questioning how we could adhere to other categories. For example, using the framework to understand how to support the psychological component of *doing*, or taking action, helped us to validate why we should provide social support for DreamGigs. At this time we have not integrated an accountability structure into the system, which could prevent job seekers from fully taking action. We assigned the third

category, persistence of empowerment, as *persistent* and not *transient*, because DreamGigs serves as an educational tool that expands users' career opportunities beyond their use of the system. Creating a transient system was not our goal. Finally, we adopted both an *expert* and *participatory* mindset. We extended the DreamGigs concept from past HCI research (expert) and iteratively developed the system with feedback from job seekers (participatory).

Lines of Research: Overall, we found that our research aligns with three of the eight lines of research outlined in the HCI empowerment framework [38]: *Skills and Education*, *Technology for Development*, and *Empowerment through Design Process*. DreamGigs is a technology that "allows users to extend their skills or knowledge, which is expected to benefit them beyond system use" [38, p.244:5]. Our work aligns with the *Empowerment through Design Process* line of research because of our user-centered design process. While past works falling into this category per Schneider et al. [38] are transient in nature (i.e., meaning immediate empowerment), our work would be among the very few studies that are persistent in nature. Last, our work also aligns with the *Technology for Development* line of research because DreamGigs "aims at balancing social power by creating opportunities for the disadvantaged" [38, p.246:2]. Using this framework helped us to question ways to improve DreamGigs going forward as well as compare and contrast our work alongside other HCI empowerment research. Going forward, we question the boundaries of covering multiple lines of research—should this be the aim of future HCI empowerment research, or only under certain conditions? If so, what are these conditions?

9 LIMITATIONS

As stated in Section 1, DreamGigs helps job seekers build their human capital and find available jobs and volunteer opportunities. This allows job seekers to be more proactive in their job search, which in return improves their employability. However, we would like to highlight and acknowledge that structural powerlessness has put low-resource job seekers in a position of extreme disadvantage, which we do not and cannot completely resolve in this study.

10 CONCLUSION AND FUTURE WORK

We contribute the design, implementation, and evaluation of DreamGigs, a tool that identifies the skills job seekers need to reach their dream jobs, and presents volunteer and employment opportunities for them to acquire these skills. We found that DreamGigs aids in the process of personal empowerment and contributes concrete design implications for mitigating aspects of powerlessness that low-resource job seekers experience.

Going forward, we plan to support job seekers by partnering with third-parties such as community organizations and career counselors to deploy DreamGigs in the field. Our hope is to support job seekers in taking action to pursue their dream jobs.

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