

Do Massive Open Online Course Platforms Support Employability?

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ABSTRACT

Past research suggests that many individuals take Massive Open Online Courses (MOOCs) for employment-related reasons. It is unclear, however, how learners leverage MOOCs for employment and how effectively these platforms support employability. To explore this further, we surveyed 441 learners and interviewed 22 learners motivated to take MOOCs for reasons related to financial limitations and/or reasons related to employment. Using the three dimensions of employability as a framework—human and social capital, career identity, and personal adaptability—we find that while most of our participants were optimistic about the potential for MOOCs to improve their employability, there was very limited tangible evidence of employment mobility from taking MOOCs. Though MOOCs support human capital, there are opportunities to further support social capital, career identity, and personal adaptability. We contribute a deeper understanding of learners who use MOOCs for employment and provide concrete design implications for MOOC platforms to better support employability in the future. We found very few low SES learners using MOOCs for reasons of employment and identify opportunities for MOOCs to reach and support these learners.

Author Keywords

Massive Open Online Courses; education; employment; employability; socioeconomic status

ACM Classification Keywords

H.5.m. Information interfaces and presentation: Misc.

INTRODUCTION

Today's Information and Communication Technologies (ICTs) offer solutions to address one of society's most pressing problems—unemployment [4, 22, 25]. However, most of the research today focuses on how increasing ICT

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skills [18, 23], or how social capital from social networking sites such as Facebook, could lead to employment [4]. Very little CSCW or HCI research explores whether and how ICTs can support employability, which is defined as one's capacity to gain and maintain employment [17]. An individual's employability is a key contributor to their career success, and is enhanced by the following dimensions: developing human and social capital, career identity and by adapting to environmental demands [17]. Though economists and sociologists have extensively studied various dimensions of employability, few HCI and CSCW studies have applied this concept to evaluate whether technologies could effectively aid in employability.

Using one dimension of employability, social capital, Burke and Kraut found that bonding social capital, or those relationships between close friends and family, was predictive of finding employment within three months of job loss on Facebook [4]. However, little research has investigated the effectiveness of such tools on other dimensions of employability. MOOCs provide opportunities for individuals with Internet access to enroll in a wide range of courses, which provide human capital and access to individuals around the world. These platforms allow those enrolled to learn from distinguished faculty from some of the world's most elite schools [33]. Finally, MOOCs are constantly updated with new material, remove the barriers associated with course registration and significantly reduce the cost of a traditional education [33]. Given these paybacks, MOOCs are in a position to support education as well as the three dimensions of employability.

A large majority of those enrolled in MOOCs have advanced degrees [9, 11, 28] and are already employed [13, 28]. These findings suggest that those who are highly educated and employed may be driven to pursue further education and advance professionally outside of their current place of employment. However, this research provides little information about whether other populations, particularly those that are less advantaged (e.g., low socioeconomic status, limited education, finances, employment), have similar intentions. Friedman from the New York Times' has proclaimed MOOCs' potential for closing the gap between the needy and elite and wrote, "Nothing has more potential to lift more people out of poverty—by providing them an affordable education to get a job or improve in the job they have" [16]. In addition to understanding the potential for MOOCs to support

employability, we wanted to explore this further by targeting low SES learners in our recruitment process.

In this article we answer the following research questions: 1) How are learners using MOOCs for employment? 2) Do these learners represent learners with financial constraints? 3) How do MOOC platforms support employability and are they effective? We present the results of 441 surveys and 22 qualitative interviews with MOOC learners motivated to take courses for financial and/or employment-related reasons. These learners reported taking MOOCs to receive training for their next job, to increase their chances of employment, and to overcome financial problems related to obtaining an education. We hypothesized that MOOCs could provide an opportunity for individuals, particularly among these populations, to access knowledge and skills that could lead to employment. Our results reveal that most of our interviewees were optimistic about the potential for MOOCs to improve their employability. However, participants in general presented very limited tangible evidence of employment mobility as a result of taking and finishing MOOCs. As a result, we make the following contributions:

- We build upon prior MOOC research [2, 9, 11, 20, 27, 28, 32, 33] by providing detailed insights into how learners motivated by employment-related reasons perform in these courses and leverage resources.
- We provide deeper insight into learners motivated to take MOOCs for job-related reasons. We suggest the following categorizations for these learners: learners that transition to new fields; learners that are looking to be promoted in their current field/job; learners looking for new positions in their current fields or jobs; and learners looking for a refresher in their current area of work. This extends motivations proposed in the Online Learning Enrollment Intentions (OLEI) scale [27] and allows us to better understand these learners in the future.
- Social insights into lower SES learner experiences and perceived and actual barriers to employment.
- Concrete design implications for MOOC platforms to better support employability in the future.

To the best of our knowledge, these results derive from one of the first qualitative studies of MOOC learners in the U.S. and how they use MOOCs for employment.

Related Work

Past research of learners' motivations for taking MOOCs suggests that many individuals take MOOCs for job-related reasons such as skill development and aspirations to change careers [27]. However, understanding how effectively MOOCs address this need is not well understood. We

suggest leveraging the dimensions of employability as a framework for evaluation and describe them next.

Employability

Employability alone does not guarantee employment; however, it enhances an individual's likelihood of obtaining employment [17]. Employability entails a combination of three synergistic component dimensions—human and social capital, career identity, and personal adaptability. Though an individual is responsible for maintaining his or her employability, existing HCI and CSCW research suggests that ICTs can support certain aspects of employability [4, 8, 11, 18] such as human and social capital.

Human and social capital both influences one's ability to identify or realize career opportunities [17]. Human capital factors include education and experience, which [24] found to be the strongest predictors of career progression. Social capital, or the benefits inherent in one's social network, has been shown to be beneficial in job search [17, 31]. Individuals using social networking sites such as Facebook and LinkedIn leverage social capital for job finding. LinkedIn, a professional networking site, recently acquired Lynda.com, a software-training site [25]. This acquisition could help to build human capital, to strengthen employers' abilities to find employees, and to support career identity [25], which is discussed next.

Career identity relates to one's career experiences and aspirations [17]. For example, career identity addresses the question of "who am I?" or "who do I want to be?" and could be expressed in the form of stories, or narratives. For example, imagine Zuri desires to be a human resources (HR) manager at a high-tech software company. She already has a business administration degree with a specialization in HR. However, she decides to take courses in software engineering and management to strengthen her chances of meeting her goals. This is a sample career narrative. ICTs could support career identities by helping individuals to create these narratives, or address these questions.

Personal adaptability is important as it allows one to adapt to the changing demands of the work environment and job market. Though characteristics of personal adaptability are intrinsic to the individual (e.g., propensity to learn, optimism, self-efficacy [17]), ICTs could support this dimension of employability as well. For example, ICTs could help individuals identify and realize career opportunities. Understanding how ICTs such as MOOCs support or do not support these dimensions of employability is an open area of research.

Leveraging MOOCs for Employment

Early MOOC demographic data provide insight into the types of students that take MOOCs. Results from a Coursera demographic survey of their first course, Machine Learning, found that half of the 14,045 respondents were

full-time professionals employed in technology [28]. Forty-one percent of those identified themselves as “professionals currently working in the software industry” and nine percent as professionals working in other areas of the information technology industry. Nearly 20% were graduate students in traditional post-secondary education programs and another 11.6% identified themselves as undergraduates. Of the remaining respondents, 3.5% were unemployed or employed outside of the technology industry; one percent were enrolled in a K-12 school program, and 11.5% identified themselves as “other.” When a subset of 11,686 participants was asked why they chose to take the course, 39% responded that they were “curious about the topic,” another 30.5% said they were interested in the potential to “sharpen the skills” used in their current position, and 18% were interested in the course as a means to “position [themselves] for a better job” [28]. Similarly, more than 75% of students taking Udacity’s first course, “Artificial Intelligence,” were taking the course to “improve their skills relevant for either current or future employment” [28]. Based on this data, the majority of the learners enrolled were either highly skilled or knowledge workers with greater job security. Though these results were informative, there was very limited insight provided on those that were unemployed, or employed outside of the technology industry.

Another study identified employment as an important motivator for taking MOOCs. In this study, more than half of learners who enrolled in 14 Stanford Coursera courses (56%) reported being motivated due to job relevance, and more than a third (36%) were motivated by ambitions to change careers [27]. However, this research does not specify how effective MOOCs are in supporting these goals and offers no information regarding whether these individuals face financial constraints. Understanding MOOC learners from this perspective is limited.

Understanding Broader Populations in MOOCs

It is unclear how less educated and less affluent populations [9, 11, 26] leverage MOOCs and for what reasons (e.g., job-related reasons, financial constraints). Existing research suggests that these populations are significantly underrepresented in MOOCs [2, 11, 13] and is an open area for investigation.

Ho et al. [20] analyzed 17 online courses offered on the edX platform and sought to understand how technologies could facilitate effective teaching and how students learn both on-campus and online [20]. Cited in Allen and Rutter [2], Chuang, a professor of electrical engineering and computer science at MIT and coauthor of [20], states, “while typical MOOC registrants have a college degree already, hundreds of thousands of our registrants do not...These MOOCs are reaching many nontraditional and underserved communities of student learners, very different from typical students on campuses at traditional universities” (pp. 2-3). If this is true, are these learners

motivated to take MOOCs for employability or other reasons?

Research Questions

To the best of our knowledge, no research to date explores the potential for Massive Open Online Courses to aid in learners’ employability or the inherent features of the platform to do so. Similarly, little research has explored how populations with limited education, employment, or finances leverage MOOCs for reasons of employability. To help narrow this gap, we explored three primary research questions:

- How are learners using MOOCs for employment?
- Do these learners represent nontraditional and underserved learners as suggested in [2]?
- How do MOOC platforms support employability and are they effective?

METHODS

We conducted a recruitment survey and 1-2 hour semi-structured interviews to address our research questions. Our goal was to recruit learners who were taking MOOCs for employment-related reasons in several states that had either suffered from the economic decline and/or were known for their poor education systems (e.g., CA, IA, IL, IN, MI, OH, PA, NE, TX) [1, 39]. We targeted lower-income, unemployed, and/or less educated learners that could not afford a formal education.

Dataset

Six Coursera courses were offered by the University of Michigan from Fall 2012 through Winter 2013, for 11 courses overall. In total, 666,407 participants registered for these courses; however, only 49.4% (N=329,623) provided clickstream data (e.g., took quizzes, watched videos, participated in forums). Clickstream data provided IP address geolocation, which were used to determine learners’ geographical location (e.g., country, state, city, zip code), and could be linked to email address. We contacted participants via email.

Recruitment Survey

An invitation to participate in a three-minute Qualtrics survey was sent to all IP addresses from our targeted locations. We provided participants with a 1/500 chance to win \$100 depending on the number of respondents (e.g., for every 500 surveys, we would raffle \$100 gift card). We sent emails to 6,881 learners, and 211 of these bounced.

We designed this three-minute survey to help us access a population that could best address our research questions. The survey alone provided us with some insights to our question. The recruitment survey included motivations for taking courses (see Figure 1), which other MOOC platforms besides Coursera they had enrolled (e.g., edX, Udacity, Khan Academy, Udemy), the number of courses

they had enrolled in the past two years, and demographic information. We asked demographic questions such as the highest grade of school completed, yearly household income and current employment status (e.g., employed for wages, self-employed, out of work looking for work, unable to work), and zip code. We also asked them for their year of birth, race and ethnicity, and to identify their households as low, medium, or high income.

We asked open-ended questions of those who stated that they were taking the MOOCs for training purposes and/or to increase their chances of employment. Examples include, “What specific training do MOOCs provide?” and “What type of training do you seek for your next job? We also asked those individuals about the specific training MOOCs provided that could increase their chances of employment and to specify their definition of affordability (e.g., what does ‘not being able to afford a formal education’ mean to you?).

Finally, we asked those among our targeted population whether they would be willing to be interviewed and if so, we asked for their contact information. Since this was a recruitment survey, we used Qualtrics’s survey logic to end the survey for individuals not motivated to take Coursera courses for employment-related reasons, or reasons of affordability. We were only able to interview those remaining participants that provided contact information and were available to interview.

Motivations	
To increase my chances of employment	To see what Massive Open Online Courses are all about
To get training for my next job	To learn more about the course topic
For personal development	I prefer learning online
To be part of a big community of learners	To help me develop professionally in order to advance my career
The course is offered for free	I cannot afford a formal education
A friend or colleague recommended it	

Figure 1 - Motivations for enrolling in MOOCs

Interviews

We invited those respondents to be interviewed that provided their contact information, and indicated their motivations to take MOOCs were due to affordability and/or employment related purposes (e.g., advance career, increase chances for employment, seek training for next job). We contacted participants through email or phone. We leveraged Skype, Google Hangout, or phone to conduct interviews among those unavailable for face-to-face interviews. These solutions offered the ability to communicate over long distances with the option of using

video. Interviews lasted 1-2 hours and we compensated interview participants with 30 USD for their time.

We conducted 22 semi-structured interviews to allow new concepts and ideas to arise during interviews. We selected a qualitative approach, as the study was exploratory in nature. The goal was to gain a deeper understanding of learners’ MOOC experiences as they related to professional growth, development, training, and opportunities for employment and to assess whether and how MOOCs supported employability. We asked questions related to participants’ prior experience with MOOCs, the courses they took, their personal goals for each class, barriers they faced, and what they liked best and least about MOOCs. We also tried to learn more about participants’ general strategies for economic growth and development and whether they targeted—or were more willing to take—certain types of courses (e.g., business, technical, foundational).

Data Analysis

We used descriptive statistics to analyze survey data. Open-ended survey data were individually coded and discussed among the second and third authors until agreement was reached. Internal consistency was not measured statistically due to the limited number of responses, though coders held discussions until consistency was reached. All one- to two-hour interviews were digitally recorded and professionally transcribed; we used Nvivo software for coding. Our interviews lasted from mid-December 2013 until the end of March 2014.

The third author created a codebook with 34 provisional codes based on past MOOC research, employment literature, and our research questions (e.g., motivations, course goals, skills, features used, received certifications, include courses on resume). The second and third authors worked closely together to conduct interviews and created memos, which summarized results and noted key themes at the completion of each interview. Provisional codes were updated based on discussion until agreement was reached on primary codes. This process happened iteratively until the changes in the codes stabilized [19]. Interviews were transcribed and coded.

To ensure transparency and agreement on coding, all authors met for a four-hour detailed discussion and activity to identify emerging patterns from the interview codes. Verbatim interview quotes were used to demonstrate these patterns and these themes were revised until group consensus was reached [30]. We report the results of our surveys and interviews next.

RECRUITMENT SURVEY RESULTS

We identified approximately 70% of user IP addresses using IP Geolocation. Of the 6,881 surveys emailed, 4 failed immediately and an additional 207 surveys bounced, leaving 6,670 surveys that were received by participants.

Out of these, 6.6% (N=441) of learners responded to the survey. This response rate does not vary much from past Coursera response rates. However, we note that the list of learners is based on IP addresses and to the extent that learners could use more than one address to access lectures, this response rate could be an underestimate.

MOOC Experiences and Motivations

We asked participants about Massive Open Online Course websites they enrolled besides Coursera, the number of courses they had enrolled in in the past two years, and their motivations for taking these courses. Of the 410 respondents answering these questions, a large majority (N=360) had not taken any other platforms listed (e.g., Udacity, Khan Academy, edX, Udemy). EdX, Khan Academy, and Udacity were the most popular sites used at 28.3%, 27.8%, and 26.8% respectively. 21.5% of these learners had enrolled in OpenCourse Ware. Of the 410, 54.9% had taken 3-10 courses, 24.4% had taken 1-2 and 15.1% had taken 11-19 courses total. Participants specified interest in the following subjects in open-ended responses for employment purposes: computer science, programming, statistics, business and finance.

Learner Motivations

Across all survey respondents, the three most common motivations for taking MOOCs were: personal development 84.4% (N=346), to learn about a new topic, 77.3% (N=317), and because the courses were free 65.9% (N=27). Only 10.7% (N=44) learners indicated an inability to afford a formal education, which is similar to past research findings [9, 11].

Nearly half (47%; N=209) of learners indicated that they took MOOCs for employment-related reasons. This percentage is slightly less than past research exploring 71,475 learner motivations across 14 courses offered by Stanford University through Coursera and OpenEdX. Researchers found that 56% of these learners were motivated to take courses due to job relevance and 36% were motivated by aspirations to change careers [27]. This disparity could exist because of the types of courses offered or the types of learners enrolled; however additional details are needed for a finer-grained comparison.

We allowed survey respondents to include motivations for taking these courses beyond the options we initially provided. Those responding to the open text entry cited a wide variety of motivations that included fun (N=4); a passion for learning (N=15); a desire to prepare for college (N=5); easy access to courses (N=3); curiosity (N=3); a desire to refresh their knowledge (N=3); and eagerness to use the platforms for social networking (N=2). In fact, those learners interested in leveraging MOOCs for social networking were excited to communicate with people from around the world. As one learner responded, *“Yes, I love the comments and involvement of people from around the world. Their comments and thought processes enrich me.”*

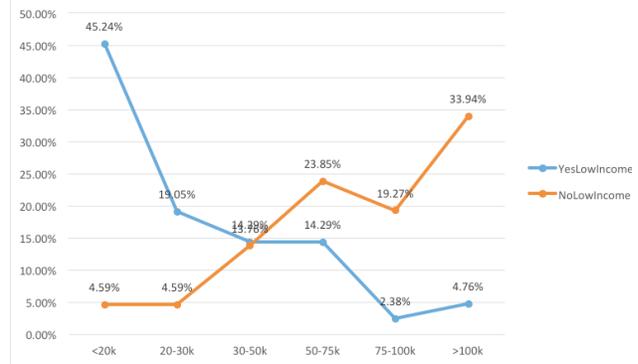


Figure 2 Percentages of participants at income levels <20K to >100K and whether they self-identify as low-income or not

Overall, these motivations are similar to past research reporting on learner motivations [11, 27] though our results offer some insight about cost as a factor to enrolling in these classes, which is not discussed in the OLEI scale described in [27].

MOOC Employability Potential

We asked all respondents why MOOCs could or could not increase employment. Out of our 441 participants that responded to this question, only 10% (N=44) gave valid text-based responses. Those that felt MOOCs increased their chances of employment felt so because MOOCs provided learners with new knowledge (N=17) and helped them prepare to develop new skills (N=14); taking MOOCs showed initiative to employers (N=7) and helped learners build confidence (N=3). One survey respondent stated, *“It will greatly increase my chances of employment because I have been a stay home mother for a long time. I can prove that I am a quick learner [as] programming is pretty difficult.”* Those that did not believe MOOCs helped with employment and provided valid responses (N=3), felt that way because they did not see employers recognizing or valuing the courses. Another learner asserted, *“Employers have no respect for MOOCs.”*

Learner Demographics

We compared age and education demographics against our wider Coursera sample (N=41,744) to ensure these results generalized to our previous findings. Overall, we found that a greater proportion of those responding to our survey was aged between 25-34 (44.7%) and was either in or had already completed a graduate education (54.8%). This also compared to past work, which found a greater proportion of respondents, aged between 25-34 (43%) and in or had completed graduate education (39.8%), [11,20].

Due to survey skip patterns to aid in efficient recruitment of interviewees and because those surveyed did not respond to all questions, various sub-samples exist for the next set of demographic-related questions asked. Of those that indicated they were taking MOOCs for employment-related reasons (N=209), we asked whether they lived in the U.S.,

if we could contact them for a follow-up interview, their income and highest level of education completed, and whether they considered their household to be low-income.

Eighty-eight percent of learners (N=184) answered whether they lived in the U.S. and of those, 89.1% (N=164) responded yes. Out of those learners that responded yes, approximately 75% stated that they were willing to be interviewed (N=137). Eighty-five percent (N=117) specified their household income. Of these, the majority earned 75K USD or more (45.3%, N=53); 34.2% (N=40) earned over 30K USD but less than 75K USD; the remaining 20.5% (N=24) earned \$30K or less.

In terms of income and affordability of education, our results demonstrate that learners perceived our survey question related to the ability to afford a formal education very subjectively. Figure 2 shows how some people consider themselves low-income even with an income of 100K USD and above, while others consider themselves high income with an income of less than 20K USD per year. One learner provided the following in an open-ended response, *“While I did not check ‘I cannot afford a formal education’ because it is not strictly true, I would not have been able to afford to engage in the broad range of subjects that I have through MOOCs.”*

Eligible Interview Participants

As we stated earlier, only 10.7% (N=44) indicated an inability to afford a formal education. Of these, only 29 met our criteria (e.g., by either indicating that they were motivated to take MOOCs for employment-related reasons or were unable to afford to pursue a formal education), agreed to be interviewed, and provided contact information. From the final pool, we successfully selected 22 participants within our allotted time who were living in the United States—10 female and 12 male participants from the following U.S. states (CA, IA, IL, MI, OH, PA, NE, TX). Participants came from a wide range of household incomes and held a number of vastly different occupations (e.g., technical writer, homemaker, screen writer, financial analyst, researchers, IT specialist, and software and web developers). Three learners were unemployed and out of work looking for work and two were students. Though there are no specific guidelines for how SES should be measured, widely accepted definitions combine family income, education, and occupational status [21]. Given that the majority of learners taking MOOCs generally have high income and are well educated and employed, for the purpose of this study, low SES learners were classified as learners with less than a bachelor’s degree who were either unemployed, or had a combined household income of less than 50K USD. Those reporting a total household income of less than 50K but greater than 30K USD had at least one additional adult household member. Given these criteria, we classified ten participants as being of low socioeconomic status (SES). We focused on those learners with less than a bachelor’s degree. In the U.S., as of

January 2015, the unemployment rate of those with a bachelor’s degree and higher was 2.8% while those with less than a bachelor’s degree had an unemployment rate of 19.1% [38]. We did not notice many differences between these participants’ responses versus higher SES participants; any distinction about these participants will be highlighted in the interview results that follow. We do wish to call attention to the small number of learners that fell into this category despite our efforts to recruit individuals from these populations.

INTERVIEW RESULTS

In this section, we discuss four different categories of learners and distinct learner motivations, learners’ general perceptions about MOOCs, and their effectiveness in helping with employment. We then explore low SES learners’ social insights regarding their MOOC experiences as they related to employment. Next, we provide a summary of our findings. Finally, we consider concrete design implications that could lead to MOOC platforms that better support those who are using MOOCs for enhanced employability.

Four Categories of Learners and MOOC Achievements

We used our interview data to categorize learners taking MOOCs for employment-related reasons. We created an affinity diagram capturing participant responses to two interview questions: “Can you tell me a little about why you decided to take the course?” and “How has participating in MOOCs helped you in terms of ‘getting ahead?’” Four categories of learners emerged from this exercise. In order of frequency, it was 1) learners looking for a refresher in their current area of work followed by 2) those looking to be promoted in their current field/job, 3) learners looking for new positions in their current fields or jobs; and 4) those transitioning to new fields. Several respondents fell into multiple categories. Understanding the four categories of learners clarifies what groups MOOCs could target in the future as they relate to employment and employability and how best to support learners’ career identities.

Interestingly, all of our participants earned a certificate for one or more of the courses they took. Our interview results indicate that nine (N=9) of our participants’ earned a certificate of distinction, with five of these learners being low SES learners (out of ten). This supports past research that found learners who stated an inability to afford a formal education had a statistically significant higher rate of completing courses with certificates of distinction than those that did not indicate an inability to afford a formal education [11]. Low SES learners described their certificates of distinction as an award—it was not necessarily a priority. On the other hand, higher SES learners responded, *“I do want to complete courses and assignments along with the free certificate to show for it”* (P0405) and *“I felt that it would help legitimize/add credence to the fact that I had taken the course. MOOCs*

are still not well known/well respected compared to standard education” (P1223).

Opportunities and Barriers for Employment

We report our interviewees’ general perceptions about whether MOOCs play a role in economic mobility in the U.S. We next discuss whether learners felt that MOOCs would increase their chances of employment. We then discuss responses for what types of courses learners felt they needed for employment, what type of training they were looking to obtain for their next job, and how MOOCs should be improved to increase opportunities for employment overall. Finally, we conclude with details on how the learners experienced employment benefits as a result of taking MOOCs.

General Perceptions of MOOCs and Employability

Like our survey results, our interviewees provided mixed responses on whether MOOCs play a role in economic mobility in the U.S. An overwhelming majority was optimistic (N=14); three (N=3) felt pessimistic about MOOCs; another three were mixed in their views (N=3), and two (N=2) stated that it was too early to tell.

Those optimistic about MOOCs felt they were beneficial for introducing people to new topics and improving skills in their current lines of work, and for their capacity to provide equal opportunities for individuals otherwise unable to afford education. For example, “MOOCs allow for more equality in the classes (high school kids and older adults can all take courses)”-P02272; P03022 stated, “It can help more people be self starters or business owners themselves if they can learn the right skills from MOOCs.”

Those pessimistic about MOOCs made comments about the lack of credentialing. For example, P02272 stated, “You aren’t going to succeed in corporate America without an accredited degree.” P01211 was “not sure how much recognition there is for MOOCs for the credential in itself,” and P0125 stated, “It’s just a few people that are gonna be able to make this work, because it’s not easy and you need to pay the bills--you need to pay your rent; and you have a family life, you have a broken marriage. Or you have kids that you need to take care of.”

Advertising MOOCs for Employment

To understand whether interviewees felt that MOOCs would increase their chances of employment, we asked them if they included the courses taken on their resumes. Resumes provide a way for those seeking employment to advertise their knowledge, skills, and experience to employers. Six participants (P0304, P03051, P0313, P0327, P0125, P03022) said that MOOCs made them more employable and more eligible for employment opportunities. In fact, these individuals put at least one or more MOOCs they had taken on their resumes. However, eight of the 22 participants were not actively looking for a job and therefore had not put these classes on their resumes.

Though seven of the remaining 14 learners interviewed did not put MOOCs on their resumes, they said they would consider doing so in the future. Only one participant, P1226-2, stated that he would never put these courses on his resume. He had some reservations about how online education was perceived by employers; we discuss this participant later: “I doubt that any serious software company, for example, will open [their] arms [if you] go to them and then say, ‘Hey, I completed [a] Coursera Algorithm class, will [you] give me a job?’”

Opportunities to Improve Employability with MOOCs

While our survey results suggested that most learners were interested in learning about subjects such as computer science, programming, statistics, business and finance, participants in our interviews had a hard time identifying which courses were needed to help them become more “employable”. Most participants (N=13) had taken these types of courses (e.g., computer science, programming, statistics, business and finance). Five participants listed finance and statistics as specific courses they found to be valuable. One participant mentioned soft skills such as communication and those basic skills such as keyboarding would be valuable for some of her colleagues (though she never discussed MOOCs with them). P03022 and P01212 stated that project-based courses leading to tangible results (e.g., a portfolio) would be valuable as there is a need to demonstrate skills needed when transitioning to new jobs.

Toward the end of the interview, we asked interviewees what, if anything, they would change about MOOCs to better support their employment. In total, six learners said “nothing”; eleven gave feedback non-specific to MOOCs (e.g., flexible courses and more course material or feedback specific to certain courses). Two of the remaining five learners would add improved networking features; the other three would add more technology-related courses and company-sponsored MOOCs versus those sponsored by a university. In terms of improved networking features, P03051 stated: “I think that’s the biggest thing that’s missing from the online experience is the opportunity to sit down and maybe work on projects together.” P0114 compared taking MOOCs with ‘brick and mortar’ courses and discussed how he was unable to talk to the professor to learn more about the professor’s career path: “...so it’s definitely the disconnect between the regular [classes and] between...online courses that are free. ...Being able to talk to a professor and say, ‘Where did you come from?’ That’s like a personal thing obviously...”

Employment Benefits Achieved in MOOCs

Finally, we conclude with details on how MOOC learners have benefited in terms of employment. Thirteen learners stated that MOOCs were beneficial in their current positions. Only three of the 22, however, gave affirmative responses to whether MOOCs helped them shift to a new job, and when asked to explain, they said they were only

hopeful and still considering the benefits of taking these courses. In terms of finding new employment, participants' explanations were not consistent with their initial (affirmative) responses. For example, P0327 and P405 were only hopeful: *"Actually no, but I fully expect they will as my job search intensifies in the near future,"* (P3027) and *"Not officially, but I'm hopeful. I won't be able to achieve my goals by taking just two or three courses. I need the courses to develop competencies and achievements that will help me make the shift. That is just going to take some time, and I feel the limiting factor is on me being able to take the courses and learn it,"* (P0405). P12261 indicated that he was *"still working on those possibilities."* Overall, we received positive responses about whether participants believed MOOCs had tangible benefits in their current jobs. Tangible benefits included enhanced credibility, a greater understanding of how things worked in their existing companies, and an improvement in current skillsets on the job (e.g., statistics, entrepreneurial skills).

Social Insights from Low SES Learners

One of our goals was to explore whether learners represented non-traditional or underserved learners. Due to the small number of participants, we wanted to provide social insights into low SES learners' experiences with MOOCs regarding employment. Interestingly, four out of the ten low SES learners did not indicate a motivation to take MOOCs for employment (P0302-1, P0228, P02272, P0114). These learners enrolled in MOOCs primarily due to financial constraints—e.g., an inability to afford a formal education. We talk about these learners next. We then discuss insights from these few low SES learners motivated to take MOOCs for employment-related reasons.

Education and Affordability

As stated earlier, we suspected that measuring one's ability to "afford" an education alone might not be reliable since the concept is somewhat subjective and open for interpretation. The term 'affordability' in relationship to education could be defined by time or financial constraints. Therefore, we asked interview participants to clarify what the term meant to them. Fourteen (N=14) participants indicated an inability to afford a formal education for at least one motivation for enrolling in MOOCs. More than half of these participants (N=8) indicated that they were referring to the financial cost of an education (5 low SES; 3 high SES); two were referring to affordability in terms of time (both high SES), and the remaining participants (all low SES) said they were referring to other, perhaps more nuanced, reasons. For example, according to P12262 (low SES with a trade/technical/vocational degree), *"Family issues created the first impediment [to completing his bachelor's degree], and then educational costs were the second barrier."*

Perceived Employment Barriers and other Limitations

Finally, we discuss some of the barriers low SES participants perceived and experienced when taking MOOCs for employment-related reasons. Only one of our low SES learners (P02272) mentioned issues around MOOCs and their lack of accreditation. A lack of accreditation was more of a concern for high SES learners. P1226-2 (a low SES learner that was mentioned earlier) perceived that the reputation of online education had been "tarnished" by for-profit universities, and as a result would never include MOOCs on his resume. P0401 (low SES), who was out of work and looking for work felt that MOOCs could only help those who are already employed. P03021 (low SES) had not included MOOCs on his resume because he felt that MOOCs were too informal. He stated, *"If I did pay...then I'd be more likely to list it 'cause it seems more formal."* On the other hand, P03051, another low SES participant began adding MOOCs to his resume as he felt it was a sign of qualification for a particular position.

Other barriers mentioned included: a lack of overall technical literacy (e.g., difficult for some to leverage the platform) and the fact that taking these courses does not or cannot replace actual experience. These social insights provide details into what some underserved learners may face when taking MOOCs though these learners are often underrepresented in these platforms [9, 11] and represented slightly less than half of our participants (N=10).

DISCUSSION AND DESIGN IMPLICATIONS

Nearly half of our learners reported taking MOOCs for employment related reasons; past research found that 56% of their learners did so [27]. Unfortunately, very few of our low SES learners were leveraging MOOCs for employment. Nevertheless, the goal of this work is to understand if and how MOOCs support employability among those who do take MOOCs for employment-related reasons. We use the three dimensions of employability to frame our discussion.

Human and Social Capital

At the time of the interviews, MOOC platforms such as Coursera supported the addition of accomplishments to LinkedIn profiles [6], which could help employers find qualified employees. However, few learners made use of this feature.

Interviewees spoke of the benefits of courses as they could enhance their credibility at work, improve their job skills, introduce them to new topics, and improve access to knowledge at any time, which support the need for additional human and social capital within the platform. For example, participants expressed interest and value from computer science, programming, statistics, business and finance courses in our surveys. However, some of our interviewees requested more tangible benefits from MOOCs such as more project-based courses and the ability to interact with others. Learners could have benefited from peer discussion systems like Kulkarni's Talkabout [29].

Future CSCW research should investigate ways to connect learners to external projects to further strengthen human and social capital, or find ways to present these opportunities to learners and offer incentives for those who do so. For example, MOOCs can connect learners to projects from non-profits to provide learners with tangible experiences (e.g., website development, review and creation of business plans). These non-profits could vouch for the participants' work, which could lead to employment. This is similar to the Coursolve initiative, which harnesses MOOC learners' talents for real-world problem solving [34].

Career Identity

As mentioned earlier, career identity is described as a person's narrative to the questions "who am I?" and "who do I want to be?" Overall, neither data from surveys nor interviews showed support for this dimension of employability. In fact, our interview results and derived learner categories suggest a need for career identity support.

One participant discussed the benefits of speaking with professors and asking questions face-to-face in traditional classrooms, which is not possible within MOOCs. If MOOCs provided a way for individuals to see, or visualize their peers' and/or professors' paths to success, this could help to broaden participants' educational experiences and to support their career identities. Participant 12261's statement articulates this sentiment: *"I think [I] would of like to have known, that... what you got your Bachelor's degree in didn't necessarily have to be what you actually did for a living. That's something that was a misconception for me. That's why it took me five years to graduate."*

When asked to describe ways to improve MOOCs, another participant (P0114) indicated, *"It's really easy to talk to professors, like, 'How did get to where you are? How did you know that you like this? What can you do with this kind of stuff?' So it's definitely the disconnect between the regular, between courses like this, like online courses that are free, with being able to talk to a professor and say like, 'Where did you come from?' That's like a personal thing obviously, mostly. But yeah that'd have been nice."*

Understanding why an engineering manager who studied computer science is now taking online entrepreneurship courses might motivate a broader learning experience in MOOCs, especially for learners looking for new positions in their current jobs. Similarly, knowing that a business professor started with an English degree might encourage students to further explore a variety of their own interests and support learners transitioning to new fields. Many individuals, especially those who are less educated and have lower incomes may not have access or exposure to a wide range of fields of study as they often have no ties to those who may be more educated or affluent [10].

Future MOOC platforms could show learner profiles and career paths. Learners could choose to make their goals and paths visible to others and serve as role models. Role

modeling could help to provide structure and guidance for all learners. Specifically, this could guide those learners motivated by employment to focus their course selection on those most relevant to their career or educational goals. CSCW and HCI researchers and designers are well positioned to make this concept a reality.

Personal Adaptability

Personal adaptability is related to one's ability to meet the demands of a given situation—in this case, changing work demands or environments. Learners in MOOCs are more likely to be intrinsically adaptable or have a strong internal locus of control as they have already taken the initiative to take these courses for various reasons (e.g., jobs, training, professional development, have a passion for learning). In addition, we found that all participants earned at least one certificate and nine (N=9) earned at least one certificate of distinction.

However, in terms of career identity, not all learners had a clear direction or path toward a specific career. MOOCs could support personal adaptability by helping learners understand which skills may be needed for current and future job markets. MOOC platforms have data that could help identify trends in terms of courses taken, activities in these courses, certificates earned, or which tracks learners have taken (e.g., Signature Tracks in Coursera). To a new learner using Coursera for employment, this could signal market demands or changes and how other learners are adapting to these signals.

External Factors

While we framed our findings using the three dimensions of employability as stated by [17], several reoccurring results do not fit within these dimensions. For example, since MOOCs offer no official certification, many participants perceived that employers would not recognize MOOCs. In another case, the reputation of online learning was perceived a limitation.

As stated earlier, individuals are responsible for their own employability. However, whether external factors such as employer attitudes toward individuals who take MOOCs versus obtain an education from an accredited university matters, is beyond our learners' control. Our low SES learners identified other factors not included in the framework and these were likely self-imposed (e.g., perceived reputation of online learning, low self-efficacy as a result of being unemployed, and belief that paying for classes implies formality and adds value to a resume).

Evans, Nathan and Simmonds acknowledge that external factors such as employer perceptions and job demands exist in their assessment of the dimensions of employability [14]. We acknowledge this in our evaluation of MOOCs and employability as our interviewees did raise employer perception of MOOCs as a limitation to employment. What is promising is that the Research Triangle Institute (RTI)

and Duke University found in a survey of 398 employers in North Carolina that 31% of respondents had heard of MOOCs [35]. These respondents consisted of human resources staff that represented the companies. Though most employers had not heard of MOOCs at the time, most companies were receptive to the possibility of using MOOCs in hiring and recruiting decisions.

Nevertheless, our results show a need to support perceived external barriers primarily from low SES learners. This could be addressed if MOOC platforms added support for the career identity and social capital dimensions of employability and likely benefit all learners.

SUMMARY OF FINDINGS

In summary, our results show that learners using MOOCs for employment can be categorized as follows: learners looking for a refresher in their current area of work; learners looking to be promoted in their current field or job; learners looking for new positions in their current fields or jobs; and those transitioning to new fields. Our survey and interview results show that learners use MOOCs for employment for the following benefits: easy to access resources; to improve their skills in their current lines of work; to enhance their credibility; and to better understand the operations of their existing workplace. These findings address our first research question.

Our second research question aimed to identify whether these learners represented nontraditional and underserved learners. To recruit these learners, we designed a survey asking specific questions related to socioeconomic status (e.g., household income, employment status, and education) and recruited from areas that had either suffered from the economic decline and/or were known for their poor education systems [1, 39]. Despite targeting lower-income, unemployed, and less educated learners that could not afford a formal education, very few learners represented this population. This is consistent with past research that found that MOOCs are not reaching underprivileged populations [15]. Nevertheless, we contribute social insights and barriers from our low SES participants such as educational costs and affordability, obligations to family, issues of technical literacy, and perceived barriers that if addressed, could benefit these populations in the future.

Finally, our results show that MOOCs support a partial dimension of employability—human capital, which was no surprise. MOOCs provide some support for social capital, which should be explored further and very little support for career identity and personal adaptability. We contribute design implications to help connect learners to tangible projects. This could help learners demonstrate the skills learned through MOOCs to support human and social capital. We also suggest implications for MOOCs to provide guidance for learners by making other learners' career goals visible to support career identity. To support personal adaptability, we suggest helping learners to

identify trends in learning based on course enrollment and activity. These suggestions and our method of using employability as a framework for ICT evaluation supports a research agenda that guides the evaluation and development of ICTs to support employability in the future.

Limitations

We acknowledge the limitations of our study, beginning with our small interview participant pool. We interviewed participants opting to be interviewed and those that responded to our invitations. Our recruiting method limited our ability to interview learners that may have been low SES, or unemployed and unavailable due to time or other circumstances. This small number is telling and could signal just how little this demographic actually uses MOOCs for employment. It could also suggest inefficiencies in the ways MOOCs have been advertised. MOOCs have primarily been advertised in publication venues somewhat limited to those well-educated and often wealthier individuals. However, if one of the key advantages of MOOCs is the access they provide to less educated and less wealthy populations, then advertising or promoting these educational and employment resources to these populations is a key area to focus in the future as suggested in [36]. Yet, there is a limitation based on availability—e.g., individuals from these populations may not have enough time, as indicated by some of our interviewees, to take MOOCs and/or partake in our study.

Next, the majority of learners recruited had only taken MOOCs on the Coursera platform; however, the implications should generalize to other MOOC platforms. Finally, our interviewees were confined to learners in the U.S. and from only eight states. This was intentional; an understanding of these perspectives was missing from the current literature. Because a large number of MOOC learners come from both developed countries and developing countries, the barriers learners reported in these results did not include issues that persist in developing countries such as limited Internet connectivity. However, a recent analysis of Coursera data found that career benefits were more likely to be reported by people from developing countries with lower levels of education and lower socioeconomic status [40]. Understanding differences in the outcomes of these two populations is an open area for future research.

CONCLUSIONS AND FUTURE WORK

We present the results of a study to understand if and how MOOCs could support employment. To address this question, we surveyed 441 MOOC learners and interviewed 22 MOOC learners motivated to take courses for reasons related to financial limitations and/or reasons related to employment. Overall, MOOCs support a level of human capital but offer little support for social capital, career identity or personal adaptability. We found that though most of our participants were optimistic about the potential

for MOOCs to improve their employability, in general, there was very limited tangible evidence of employment mobility from taking MOOCs. We contribute design implications to help connect learners to tangible projects that could help them demonstrate the skills learned through MOOCs to support human and social capital; provide guidance for learners by making other learners' career goals visible to support career identity; and help learners to see trends in learning based on course enrollment to support personal adaptability. We also make additional contributions:

- We build upon prior MOOC research [2, 9, 11, 20, 27, 28, 32, 33] by providing detailed insights into how learners motivated by employment-related reasons perform in these courses and leverage resources.
- We provide deeper insight into learners motivated to take MOOCs for job-related reasons. We suggest the following categorizations for these learners: learners that transition to new fields; learners that are looking to be promoted in their current field/job; learners looking for new positions in their current fields or jobs; and learners looking for a refresher in their current area of work. This extends motivations proposed in the Online Learning Enrollment Intentions (OLEI) scale [27] and allows us to better understand how best to support the career identity dimension based on these learner categories.
- We find that very few low SES learners are using MOOCs for employment related reasons. We provide some insight into barriers that the few low SES learners may face when taking MOOCs for employment related reasons. We were only able to recruit a small number of these learners, which makes it difficult to generalize these results.
- Finally, we contribute concrete design implications for MOOC platforms to better support employability in the future.

In our future work, we would like to deepen our understanding of learners leveraging MOOCs for employment and begin modeling their behaviors. If we can detect these learners and leverage their stated goals, we could provide interventions that improve their overall experience and impact MOOCs could play in their careers.

We would also like to increase MOOC enrollment of low SES and less traditional learners. To do so, we need improved methods of identifying these learners [26]. We believe expanding our research to investigate learners in developing regions could yield more promising results and insight [5, 7]. We would also like to extend existing CSCW and HCI research that aims to understand and address the needs of underrepresented populations for new technologies

[8, 10, 12, 26]. We see MOOCs as open canvases for learners at any education level and with any socioeconomic background to collaborate, innovate, grow and improve their chances of employability.

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