Understanding crowdworkers' learning practices

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Abstract
This paper reports findings of a survey exploring how crowdworkers develop their knowledge and skills in the course of their work on digital platforms. The focus is on informal learning initiated and self-regulated by crowdworkers: engaging in challenging tasks; studying professional literature/online resources; sharing knowledge and collaborating with others. The survey was run within two platforms representing two types of crowdwork – microwork (CrowdFlower) and online freelancing (Upwork). The survey uncovered evidence for considerable individual and social learning activity within both types of crowdwork. Findings suggest that both microwork and online freelancing are learning-intensive and both groups of workers are learning-oriented and self-regulated. Crowdwork is a growing form of employment in developed and developing countries. Improved understanding of learning practices within crowdwork would inform the design of crowdwork platforms; empower crowdworkers to direct their own learning and work; and help platforms, employers, and policymakers enhance the learning potential of crowdwork.

1. Background
The unfolding digitalisation of our society has stimulated the development of new types of work practices collectively referred to as 'digital work' (Huws, 2014; Lehdonvirta and Ernkvist, 2011). These digital work practices challenge traditional patterns of individual agency, organisation, power, stability, responsibility and learning (Littlejohn and Margaryan, 2013). Working under conditions of precarity, digital transformation and changing patterns of agency, workers increasingly have to initiate and regulate their own learning. Although the ability to self-regulate one's learning has been an important factor in the development of workers' professional expertise prior to the emergence of the digital economy (Zimmerman, 2006), it is increasingly becoming a central capability in the contemporary workplaces (Margaryan, Littlejohn and Milligan, 2013). As the nature of work evolves, understanding how workers learn within these new work practices becomes increasingly important.

One type of virtual work is crowdwork – a form of employment in which a large group of otherwise disconnected people are brought together within Internet-based platforms for the purpose of performing a task. These platforms act as intermediaries between employers and employees, helping oversee the definition, submission, acceptance and payment for the work done (Degryse, 2016; Irani, 2015). Examples of crowdwork platforms are Amazon Mechanical Turk (AMT), Upwork, Clickworker, Peopleperhour, CloudFactory, CrowdFlower, Freelancer and Microworker.

There are two key types of crowdwork: microwork and online freelancing (ibid). *Microwork* refers to projects broken down into microtasks that can be completed in seconds or minutes, such as image tagging or data entry, and typically requires few specialised skills beyond basic computer and Internet literacy. Distribution and monitoring of microwork takes place largely via algorithms. AMT is one of the largest microwork platforms. *Online freelancing* is a form of crowdwork in which employers contract professional services, such as web development and graphic design, to distributed workers. In contrast to microwork, online freelancing on average requires a higher level of expertise and focuses on larger and more complex projects performed over longer periods of time – hours, days or months. Within online freelancing platforms, employers rather than algorithms monitor the quality of work. Upwork (formerly oDesk and Elance) is one of the largest online freelancing platforms. Examples of crowdwork tasks are data entry, graphic design, video production, transcription, writing texts, rating sentiment about a product, screening and tagging images, searching and extracting information from websites, developing business plans or architectural designs, completing scientific surveys, developing web or mobile applications, administrative or clerical services, or providing legal and accounting advice.

In 2015 the majority of crowdworkers worldwide were estimated to be male, below 35 years old and based in the US, India and Philippines (Kuek et al, 2015). Online freelancers tend to be more highly educated than microworkers, with 75% of online freelancers and 33% of microworkers having higher education degrees; and both types tend to work for fewer than 20 hours per week on crowdwork platforms (ibid). Income generation is the main motivation for crowdworkers to sign up to crowdwork

platforms: for microworkers what they earn on crowdwork platforms represents supplementary income whereas for online freelancers it tends to be their only means of income (ibid).

In this emergent, highly distributed and fragmented type of work where workers may not have access to learning support and professional development opportunities such as training, coaching or access to experienced colleagues available within traditional employment how do crowdworkers go about organising and managing their learning? What strategies do these crowdworkers use to identify their learning needs, source relevant knowledge, and find others to learn with and from? Whilst workplace learning practices within traditional occupations have been well-studied empirically, crowdworkers' learning practices and strategies cannot be assumed to mirror those of workers in traditional workplaces. In contrast to crowdwork, traditional workplaces foster long-term relationships between workers and employers, whereas, when crowds are assembled to do work, the relationship between employers and employees may only last as long as it takes to accomplish an individual task. There is precedence for brief employment relationships in temporary and freelance work (Eurofound, 2015), but crowdwork often requires substantially shorter engagements. Also, unlike in traditional employment, crowdworkers are often anonymous to and radically disconnected from their employers and all other workers.

There are anecdotal accounts of some crowdwork platforms putting in place training programmes to help develop key skills. Examples are a service called 'Elance University' offered by Upwork which includes free and paid-for courses where workers can watch videos demonstrating specific technical skills eg 3D animation or compulsory weekly meetings run by CloudFactory for its crowdworkers to discuss management skills and long-term career aspirations (Kuek et al, 2015). However, largely crowdworkers themselves are responsible for their learning and development – they have to identify what they need to know to complete the task, how they can go about learning it, where they can obtain the necessary knowledge or skills, or who they can learn from. Crowdwork, especially microwork, has been criticised for bringing about deskilling (Degryse, 2016; Irani, 2015). Yet there has been no empirical research examining crowdworkers' learning practices, the use and development of skills within crowdwork settings and crowdworkers' own views about their learning experiences.

Also we know that crowdworkers sometimes independently self-organise into physical communities centred around universities or internet cafes or into online communities using social media and internet-based tools (e.g. knowledge sharing tools such as Turkopticon, Dynamo, Turker Nation forum and various LinkedIn and Facebook groups for AMT workers) to help each other learn the system, share experience with specific tasks, identify reliable and unreliable employers or to exchange concerns about unfair payment practices or other issues they encounter in the course of their work on the crowdwork platforms (Kuek et al, 2015; Irani and Silberman, 2013; Salehi et al, 2015). However, whether and how crowdworkers may be using these or other fora and tools to self-organise specifically for the purpose of learning or professional development is not understood.

This paper begins to address the gap in our current understanding of crowdworkers' learning practices, as well as the learning potential of crowdwork as a new and growing form of employment. The paper explores if there are qualitative and quantitative differences in learning practices within different types of crowdwork each of which is underpinned by a different work model and tasks of different complexity level. Hypothetically, the greater complexity of tasks within online freelancing coupled with estimated higher educational and skill level of online freelancers may lead to them adopting quantitatively and qualitatively different learning strategies than those adopted by microworkers. Also, the learning intensity of microwork may be lower than that of online freelancing (learning intensity being the extent to which workers doing the job require to learn something new to complete work and the range and number of learning activities undertaken in the course of completing a task). The *research questions* are:

1. What workplace learning activities do crowdworkers use and how frequently do they use these in the course of their work on the crowdwork platforms?
2. What strategies do crowdworkers use to self-regulate their learning?
3. What are the key qualitative and quantitative differences between microwork and online freelancing with regards to learning practices (workplace learning activities and SRL strategies) used by crowdworkers?

Opportunities for learning and continuous professional development are essential to productivity, performance and satisfaction of workers. Improved, empirically-grounded understanding of

crowdworkers' learning practices within the emergent digital work platforms therefore contributes to improved understanding of public policy informing current debates around regulatory issues and well-being within these new types of employment.

2. Previous research

Academic literature on crowdwork can be grouped into five types. First, there are empirical investigations into the demographics of crowdwork platforms and analyses of factors underpinning workers' motivation to engage in this form of employment (e.g. Gupta, Crabtree, Rodden, Martin, and O'Neill, 2014; Ipetrios, 2010). Whilst these studies are helpful in furthering our understanding of the crowdworkers' motivations, they do not examine learning practices. Second, there are conceptual proposals for future research and development in crowdwork in general, including non-empirical proposals about how learning may potentially be supported in crowdwork contexts rather than providing an empirical account of how crowdworkers actually learn (e.g. Kittur et al., 2013; Nickerson, 2014). Third, there are methodological papers focusing on the use of crowdwork platforms for experimental behavioural psychology and economics or business research (e.g. Paolacci, Chandler and Ipetrios, 2010; Rand, 2011). This literature offer methodological insights and useful advice on using crowdwork settings as 'online research labs', however, they do not examine learning within crowdwork. Fourth, there are reports of intervention studies in which researchers, mainly computer scientists, design, trial and evaluate various software tools to support aspects of learning such as giving and receiving feedback within crowdwork platforms (Dow, Kulkarni, Klemmer and Hartmann, 2012; Luther, Dow, Kittur, 2014). These interventions are driven by the goal of exploiting capabilities of technology and they do not shed light on the actual learning practices involved. Finally, a recent small-scale exploratory study examined the challenges and opportunities crowdwork presents for crowdworkers' employability (Barnes, Green and de Hoyos, 2015). This study does not explore how crowdworkers learn, nor does it explicitly examine the learning potential of crowdwork.

Despite lack of research on learning practices within crowdwork, the workplace learning practices of employees in traditional occupations have been studied extensively within the field of Workplace Learning (WPL), demonstrating that deep and powerful learning occurs in everyday working life (Billett, Harteis and Etelapelto, 2008; Ericsson, 2009; Felstead, Fuller, Jewson and Unwin, 2009; Illeris, 2011; Littlejohn, Milligan, and Margaryan, 2016; Malloch, Cairns, Evans and O'Connor, 2011; Marsick, 1987). Two key points from WPL research could be brought to bear on the analysis of learning within crowdwork practices. First, WPL research has highlighted the significance of *learning with and from other people*: collaboration with and guidance by 'significant others' (more knowledgeable colleagues, mentors and clients) and incidental knowledge sharing opportunities in the workplace have been shown to be important stimuli for learning (Eraut, 2007). At present we do not know whether and to what extent this important social dimension of learning is reflected in crowd workplaces. While it is plausible that crowdworkers connect to others for learning and knowledge sharing, the prevalence patterns and the precise forms of such crowdworker self-organisation for learning are not yet understood.

Second, WPL literature has emphasised the importance of both individual factors (e.g. self-efficacy, motivation) as well as environmental factors (social, technological, organisational) in fostering learning (e.g. Bandura, 1997; Felstead et al., 2009). For example, Fuller and Unwin (2004) conceptualised a continuum of expansive to restrictive organisational learning environments. Specific jobs and economic sectors have been shown to differ in their affordances for learning - their *learning-intensity* (Skule, 2004). There is scope for empirically examining the learning-intensity of crowdwork analysing qualitative and quantitative differences in learning practices, processes and potentialities between microwork, where the low-skill, convergent tasks are said to prevail, and online freelancing, where complex, divergent and specialised tasks may be the norm.

3. Methodology

This paper draws on data from two platforms representing the two types of crowdwork: CrowdFlower (microwork) and Upwork (online freelancing).

Research methods: This study is part of a larger project which follows a mixed-method, quan-QUAL, research design (Johnson and Onwuegbuzie, 2004). Phase One is a questionnaire survey with

crowdworkers to collect data on their self-regulatory learning strategies, workplace learning activities and the nature of work tasks that they engage in through the platforms. Phase Two will include semi-structured, in-depth interviews with firstly crowdworkers to generate rich descriptions and case examples of their learning strategies and practices and secondly with representatives of the platforms and selected employers to contextualise crowdworkers' perspectives. Phase Three will focus on the analysis of publically available documentation about the organisation of crowdwork and training provision as well as other kinds of support for workers' learning that may be offered by the platforms. This paper reports the initial findings of Phase One pilot survey.

Data collection instruments: Data were collected in March 2016 using adapted versions of two previously published instruments, Self-Regulated Learning at Work Questionnaire, SRLWQ (Fontana, Milligan, Littlejohn, and Margaryan, 2015) and Classification Structure for Knowledge-Intensive Processes (Margaryan, Littlejohn and Milligan, 2011). A sample full questionnaire is available from https://figshare.com/articles/Self_regulated_learning_at_work_Upwork_pilot_questionnaire/3203779

Sample: The total sample this paper reports on is 113 crowdworkers, including 20 online freelancers from Upwork and 93 microworkers from CrowdFlower.

The majority of respondents on both platforms were millennials, that is under 36 year olds. This is in line with the estimate of the World Bank report quoted earlier (Kuek et al, 2015) suggesting that the sample is representative of the overall age demographics of crowdworkers. Most online freelancers in this sample were female and most microworkers were male. The majority of online freelancers were from the US (25%), Philippines (20%), Romania (10%) and Serbia (10%), as well as one participant each from Bosnia, Canada, Pakistan, Thailand and the UK. The microworkers were more evenly spread across a broader range of countries, with the top countries being India (10%), Serbia (10%), Bosnia (10%), Bulgaria (9%), and Venezuela (8%) as well as 1-3 participants each from Greece, Indonesia, Macedonia, Russia, and Turkey, Bangladesh, Canada, Italy, Romania, Ukraine, Croatia, Spain, Vietnam, Algeria, Brazil, Czech Republic, Estonia, Mexico, Portugal, Slovakia, Sri Lanka, Uruguay, and USA.

The sample is predominately well-educated, with 80% of online freelancers and 61% of microworkers having a university degree, including 3 microworkers who said they had a doctorate. The majority of online freelancers (75%) identified as primarily self-employed, but only 32% of microworkers did; the majority of microworkers (56%) appear to be employed full-time or part-time in addition to their work on the platform. This is broadly in line with the findings of the World Bank report by Kuek et al (2015).

Participants named a very wide range of professions as their main background. Among online freelancers, many had administrative or engineering background; microworkers included also a large proportion of economists, sales people and lawyers in addition to administrators and engineers.

The majority of respondents on both platforms had between 0-3 and 4-10 years of experience in their main professional field (45% and 35% respectively among online freelancers and 42% and 32% among microworkers), which is broadly in line with the age profile of this sample. As to work experience on the platforms, a large proportion of respondents were relatively new to the platforms, especially among microworkers: 45% of online freelancers and 59% of microworkers had less than a year experience on the platform. Half of online freelancers work for up to 8 hours per week, and the majority of microworkers work up to 20 hours on the platform, including a third who work 9-20 hours per week and 21% who work 1-8 hours per week. The key characteristics of the samples are summarised in Table 1.

Table 1. Key characteristics of the sample: Microworkers (n=93) and online freelancers (n=20)

Characteristic	**Online freelancers** (Upwork)	**Microworkers** (CrowdFlower)
Age range	19 – 67	20 – 66
Generations: Millennials (born in or after 1980) Generation Y (1965-1979) Baby boomers (1946-1964)	 75% 20% 5%	 61% 32% 7%
Gender:		

Female	60%	26%
Male	40%	74%
Top countries	USA –25% Philippines –20% Romania, Serbia-10% each	India, Serbia, Bosnia - 10% each Bulgaria - 9% Venezuela - 8%
Education (highest degree):		
Secondary education	15%	26%
Undergraduate	45%	44%
Masters degree	35%	14%
Professional qualifications	5%	13%
Doctorate	0%	3%
*Employment status**:		
Freelancer/self-employed	75%	32%
Full-time employee	25%	44%
Part-time employee	5%	12%
Retired	5%	1%
Disabled, unable to work	0%	5%
Student	15%	15%
Homemaker	0%	10%
Experience in profession:		
Novices (up to 3 years)	45%	42%
Midcareer (4-10 years)	35%	32%
Experts/experienced	20%	25%
Experience on platform:		
Up to 1 year	45%	59%
2-3 years	40%	33%
4-10 years	15%	7.5%
*Job categories**:		
Admin support	55%	N/A
Writing	50%	
Sales and marketing	35%	
Design and creative	25%	
Data science and analytics	25%	
Translation	20%	
Customer service	15%	
Web, mobile, software	10%	
development	5%	
Engineering and Architecture	5%	
Legal		
Engagement on platform:		
Less than 1 hr/week	15%	0%
1-8 hrs/week	35%	21.5%
9-20 hrs/week	10%	31%
21-40 hrs/week	20%	19%
41-60 hrs/week	10%	17%
More than 60 hrs/week	10%	11%

* *Respondents could select more than one option*

Data analysis: Survey data were coded and analysed using SPSS 22. All data were anonimised prior to analysis. To ensure the quality of data and to avoid potential grievances related to compensation, survey instructions clearly specified that each worker is allowed to do the survey only once and that incomplete survey responses will be discarded and therefore not paid for. Respondents were provided with an email address to contact the researcher.

4. Results and discussion

Workplace learning activities
Survey findings suggest that crowdworkers undertake a wide range of workplace learning activities. The majority of both types of crowdworkers *regularly learn something new* in the course of their work on these platforms: 60% of online freelancers and 54% of microworkers use new information daily or weekly, and a further 44% of microworkers and 40% of online freelancers have done so monthly or at least a few times in the past six months. In addition, significant proportions of both groups regularly *perform tasks that are new to them*: 53% of microworkers and 30% of online freelancers perform new tasks daily or weekly whilst 70% of online freelancers and 48% of microworkers have taken on novel tasks monthly or at least several times in the last six months.

Furthermore, the majority of both types of crowdworkers regularly *seek to find better ways to do a task* through trial and error (85% or online freelancers and 63% of microworkers). Also, many crowdworkers regularly *attend classroom-based training courses* (50% of each group) or *participate in free online courses* (80% of online freelancers and 45% of microworkers) to develop their knowledge and skills. Importantly, just over a third of each group of crowdworkers regularly use *paid online tutorial and paid other learning resources* (35% of online freelancers and 32% of microworkers do so). Other self-initiated learning activities crowdworkers regularly engage in include *following new developments in their field* (85% of each online freelancers and microworkers); *studying professional literature* (85% of online freelancers and 80% of microworkers); and *reflecting on their work* (all online freelancers and 93% of microworkers).

The findings further suggest that the workplace learning activities the crowdworkers undertake have a considerable social dimension. Many crowdworkers appear to *collaborate with others to complete their tasks or develop solutions to problems*: 80% of online freelancers and 62% of microworkers do so at least some times or regularly. Many crowdworkers *reach out to others for advice*: only 26% of microworkers and 20% of online freelancers never do so. Furthermore, most crowdworkers - all online freelancers and 74% of microworkers- *receive feedback on their work from others*. Interestingly, many crowdworkers reported *observing and replicating others' strategies* to complete their tasks: 80% of online freelancers and 77% of microworkers report regularly engaging in such vicarious learning.

Self-regulated learning
In this sample, compared to microworkers the online freelancers appear to be more highly self-regulated learners: the average SRL score for online freelancers is 2.04/3; for microworkers it is 1.77/3.

Planning: The planning phase of SRL involves behavioural actions, learning strategies and motivational beliefs individuals adopt or undertake to prepare for work: goal setting, strategic planning, self-efficacy and intrinsic value of task.

> ***Goal-setting***: Goal-setting involves workers determining their personal standards of performance for their work, setting short- and long-term learning goals to improve their work and develop professionally, and modifying their strategies when required. All online freelancers in our sample report *setting personal performance standards* for all or most of their work tasks, but only 76% of microworkers do. The majority of both online freelancers (75%) and microworkers (64%) regularly set *short-term (monthly or quarterly) learning goals*. Also, a significant proportion of crowdworkers identify *long-term learning goals*: 55% of online freelancers and 59% of microworkers set yearly or longer goals. Furthermore, the majority of crowdworkers – 70% of online freelancers and 81% of microworkers - *monitor their own performance* and *modify their strategies* when not making progress towards their goals.
>
> ***Strategic planning:*** As well as dynamically modifying their goal-achievement strategies, the majority of crowdworkers also *change the underpinning learning goals* (90% of online freelancers and 87% of microworkers modify their learning goals). All crowdworkers in our sample *adapt their learning strategies* to each specific problem or task they are working on. Furthermore, many crowdworkers *develop plans* to describe how they will achieve the goals they have set, with 70% of online freelancers and 68% of microworkers articulating such plans at least sometimes or

regularly. Most crowdworkers *approach their work tasks in a learning-oriented* way: before beginning each task or project, 90% of online freelancers and 89% of microworkers think carefully about what they might need to learn to be able to complete the work. When faced with a challenge in their work, all online freelancers and 98% of microworkers try to understand the problem as thoroughly as possible.

Self-efficacy and intrinsic value of task: All crowdworkers in this sample except one microworker are *self-efficacious*: they report feeling able to handle most of the demands in their job. All online freelancers and 96% of microworkers said they would be able to use what they learned in their crowdwork jobs in future jobs. The *intrinsic value of work appears to be high* for these crowdworkers: 95% of online freelancers and 100% of microworkers reported that it was important for them to learn new things in their crowdwork tasks. Furthermore, all online freelancers and 97% of microworkers indicated *preference for work opportunities that require them to learn something new* and for *tasks that arouse their curiosity* even if they have to learn extensively to accomplish these tasks.

Implementation: SRL implementation processes are focused on task strategies and techniques which assist workers in executing their learning goals, organising and making sense of knowledge and information and improving one's concentration, attention and understanding. The majority of both types of crowdworkers use a range of different task strategies:

- blocking time in their calendar to work on their learning goals (80% of online freelancers and 62% of microworkers);
- making notes/diagrams to organise their thoughts (95% of online freelancers and 68% of microworkers)
- making notes about what they have learned in a private diary or a public blog (75% of online freelancers and 69% of microworkers)
- collecting information from many different sources (100% of online freelancers and 93% of microworkers) and developing their own ideas from these resources (100% of online freelancers and 91% of microworkers)
- thinking about how what they are learning is related to what they already know (90% of online freelancers and 93% of microworkers)
- applying lessons learned from previous experiences to their current crowdwork (100% of online freelancers and 98% of microworkers)

Importantly, when having difficulty to learn something, many *reach out to others* for help (85% of online freelancers and 84% of microworkers). Furthermore, many *consider how what they have learned may be of interest to their professional peers* and others in their field (80% of online freelancers and 82% of microworkers) and *share their learning* with their peers and others (75% of online freelancers and 82% of microworkers).

Reflection. Self-evaluation refers to comparing one's performance with a standard of a goal. The majority of the crowdworkers in this sample appear to be *self-reflective*. All online freelancers and 95% of microworkers regularly think about what they have learned after they complete their tasks. Many consider whether there were better ways to do the tasks after they finish (100% of online freelancers and 91% of microworkers). Furthermore, all online freelancers and 90% of microworkers think about how what they have learned through crowdwork fits into the 'bigger picture' of their own *longer-term professional development*.

Several key themes emerge from these findings:

Both online freelancing and microwork are learning-intensive, in terms of the scope and frequency of workplace learning activities undertaken and self-regulatory learning strategies adopted by crowdworkers. Crowdworkers regularly learn something new and perform novel work tasks. The novelty of the tasks undertaken may be partially explained by the fact that many respondents are new to these specific crowdwork platforms: just under half of online freelancers and just over half of microworkers have less than a year experience on these platforms. However the results suggest that the actual variability and novelty of work they undertake may not be insignificant, and this warrants further exploration through interviews and observation.

Both online freelancers and microworkers are learning-oriented. Crowdworkers reported setting and achieving learning goals, strategically and dynamically monitoring and modifying their self-regulatory strategies using a range of techniques and approaches. Their responses suggest they are reflective and ascribe significant intrinsic value to their tasks carefully thinking about how their work and learning interrelate and how their learning aligns with their longer-term work goals. Both online freelancers and microworkers undertake a range of professional development activities investing time and sometimes their own financial resources in improving their skills (although microworkers appear to engage somewhat less frequently in such professional development activities than online freelancers do). A more nuanced understanding of crowdworkers' learning and work paths, aspirations and motivations than a survey instrument can help generate is required.

Both types of crowdwork appear to incorporate a considerable social dimension, with the majority of both online freelancers and microworkers reaching out to, collaborating and learning with others, and sharing their learning with their peers and others in their networks. Who these other people are, what channels do crowdworkers use to collaborate with them, and what the role of these collaborations and social interactions is in their work and learning cannot be surmised from this survey suggesting a strong need for a more in-depth exploration and contextualisation of these findings.

The patterns of workplace learning activities and self-regulatory strategies are broadly similar across both types of crowdworkers. There are some relatively minor quantitative differences between the two groups (in favor of online freelancers). Compared to microworkers, online freelancers appear to adopt a slightly broader range of goal-setting and planning strategies. Other areas where some differences were identified include participation in formal learning, collaboration and receiving feedback. While it is difficult to know from the survey alone who the crowdworkers receive feedback from, the prevalence of feedback among online freelancers may be due to them having in general more contact with clients than microworkers tend to have.

5. Conclusions and policy implications

This exploratory study uncovered significant indications of self-regulated workplace learning and professional development occurring within crowdwork settings. These findings suggest that both online freelancing and microwork are learning-intensive, despite the differences in the nature of work tasks within these two different types of crowdwork. While there are some quantitative differences in the scope and frequency of learning activities and SRL strategies adopted which warrant further in-depth exploration through interviews, the hypothesis that microwork may be less-learning intensive is not supported by this survey. Crowdwork settings may not provide formal scaffolds or support mechanisms for learning and professional development that the traditional workplaces do, yet crowdworkers are proactively seeking and finding opportunities to develop their skills and learn individually and with others.

While the sample is small and skewed towards microworkers, the sample is representative of the population of these platforms as reported in previous studies. Being a survey-study, this research is necessarily decontextualised, however further qualitative work is planned to examine the learning practices in more detail. A further limitation of the study is a potential selection bias, whereby only those crowdworkers who have preference for survey-type tasks and are interested in contributing to scientific research may have responded. Crowdworkers who have preference for this type of task may be more highly learning-orientated, introspective and reflective than other crowdworkers. To circumvent this, in future research a survey task could be embedded within other types of tasks, such as categorisation or image recognition (as done by Kingsley, Gray and Suri, 2015).

Future research will include running a survey within a larger sample, with a balanced representation of microworkers and online freelancers. Further ethnographically-oriented (in-depth interviews, observations) research with a broader range of key stakeholders (platform providers, employers) is needed to better contextualise survey findings and develop a more-nuanced understanding of the learning practices and social interactions involved in crowdwork.

This study is significant for two reasons. First, crowdwork is a growing type of employment, in both developed and developing countries. Therefore it is important to understand how people function within this type of work, what its learning potential is, and where the gaps and issues might be. Opportunities

for learning and continuous professional development are essential to productivity, performance and satisfaction of workers. Improved, empirically-grounded understanding of crowdworkers' learning practices within the emergent digital work platforms therefore contributes to improved understanding of public policy informing current debates around regulatory issues and well-being within these new types of employment. Also, improved understanding of learning practices within crowdwork would empower individuals making a living through this platform to direct their own learning, inform the design of technology underpinning crowdwork platforms, and help platforms, employers, and policymakers enhance the learning potential of crowdwork. The open-ended comments the participants provided suggest that taking the survey was found to be a valuable learning experience in itself for this workers encouraging them to think more deeply about their work on the platforms and, quoting one microworker "developing strategies for achieving better success and earnings" on these platforms. Second, understanding crowdworkers' learning practices is essential to the enhancement of the developmental potential of crowdwork. Economists have highlighted the importance of assisting developing countries in creating jobs and generate wealth from opportunities provided by the digital economy claiming a larger part of the crowdwork value chain and developing services of higher added-value (Lehdonvirta et al, 2011). Fostering crowdworker learning could help developing countries to achieve these policy aims.

References

Barnes, S.-A., Green, A., and M. de Hoyos (2015), 'Crowdsourcing and work: Individual factors and circumstances influencing employability', New Technology, Work and Employment, 30, 1, 16-31.

Bandura, A. (1997), Self-efficacy: The exercise of control, New York: Freeman.

Billett, S., Harteis, C., and A. Etelapelto (2008), (eds.), Emerging perspectives of workplace learning, Rotterdam: Sense Publishers.

Degryse, C. (2016), Digitalisation of the economy and its impact on labour markets, Working paper 2016.02, European Trade Union Institute. [Online] https://www.etui.org/Publications2/Working-Papers/Digitalisation-of-the-economy-and-its-impact-on-labour-markets

Dow, S., Kulkarni, A., Klemmer, S., and B. Hartmann (2012), 'Shepherding the crowd yields better work', Proceedings of the 2012 conference on Computer-supported Cooperative Work, New York: ACM.

Eraut, M. (2007), 'Learning from other people in the workplace', Oxford Review of Education, 33, 4, 403-422.

Ericsson, K.A. (2009), (Ed.), Development of professional expertise: Toward measurement of experts performance and design of optimal learning environments, New York: Cambridge University Press.

Eurofound (2015), New forms of employment, Publications Office of the European Union: Luxembourg. [Online] http://www.eurofound.europa.eu/publications/report/2015/working-conditions-labour-market/new-forms-of-employment

Felstead, A., Fuller, A., Jewson, N., and L. Unwin (2009), Improving working as learning, London: Routledge.

Fontana, P., Milligan, C., Littlejohn, A., and A. Margaryan (2015), 'Measuring self-regulated learning in the workplace', International Journal of Training and Development, 19, 1, 32-52.

Fuller, A., and L. Unwin (2004), 'Expansive learning environments', in Fuller, A., Munro, A., and H. Rainbird (eds), Workplace learning in context, 126–144, London: Routledge.

Gupta, N., Crabtree, A., Rodden, T., Martin, D., and J. O'Neill (2014), 'Understanding Indian crowdworkers', Proceedings of 2014 Conference on Computer-Supported Cooperative Work, New York: ACM.

Huws, U. (2014), Labor in the global digital economy, New York: Monthly Review Press.

Illeris, K. (2011), The fundamentals of workplace learning, London: Routledge.

Ipetrios, P. (2010), Demographics of Mechanical Turk, [Online] http://www.ipeirotis.com/wp-content/uploads/2012/02/CeDER-10-01.pdf

Irani, L. (2015). 'The cultural work of microwork', New Media and Society, 17, 5, 720-739.

Irani, L., and S. Silberman (2013), 'Turkopticon: Interrupting worker invisibility in Amazon Mechanical Turk', Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Paris, France.

Johnson, R., and A. Onwuegbuzie (2004), 'Mixed methods research', Educational Researcher, 33, 7, 14-26.

Kingsley, S., Gray, M., and S. Suri (2015), 'Accounting for market frictions and power asymmetries in online labor markets', Policy and Internet, 7, 4, 383-400.

Kittur, A. et al. (2013), 'The future of crowd work', Proceedings of 2013 Conference on Computer-supported Cooperative Work, New York: ACM.

Kuek, S. C., et al. (2015), The global opportunity in online outsourcing, Washington, DC: World Bank.
Lehdonvirta, V., and M. Ernkvist (2011), Converting the virtual economy into development potential, Washington, DC: infoDev/World Bank.
Littlejohn, A., Milligan, C., Fontana, P., and A. Margaryan (2016), 'Professional learning through everyday work: How finance professionals self-regulate their learning', Vocations and Learning, 9, 2, 207-226.
Littlejohn, A., & Margaryan, A. (2013), Technology-enhanced professional learning, London: Routledge.
Luther, K., Dow, S., and A. Kittur (2014), 'How can crowdsourcing help individuals learn', Proceedings of 2014 Conference on Computer-Supported Cooperative Work, New York: ACM.
Malloch, M., Cairns, L., Evans, K., and B. O'Connor (2011), (eds.), The SAGE handbook of workplace learning, London: SAGE.
Margaryan, A., Littlejohn, A., and C. Milligan (2013), 'Self-regulated learning in the workplace: Learning goal attainment strategies and factors', International Journal of Training and Development, 17, 4, 245-259.
Margaryan, A., Milligan, C., and A. Littlejohn (2011), 'Validation of Davenport's Classification Structure of Knowledge-intensive Processes', Journal of Knowledge Management, 15, 4, 568-581.
Marsick, V. (1987), Learning in the workplace, London: Croom Helm.
Nickerson, J. (2014), 'Crowd work and collective learning', in Littlejohn, A., and A. Margaryan (eds.), Technology-enhanced Professional Learning: Processes, practices and tools, 39-49. London: Routledge.
Paolacci, G., Chandler. J., and P. Ipetrios (2010), 'Running experiments on Amazon Mechanical Turk', Judgement and Decision Making, 5, 5, 411-419.
Rand, D. (2011), 'The promise of Mechanical Turk', Journal of Theoretical Biology, 299, 172-179.
Salehi, N., Irani, L. C., Bernstein, M. S., Alkhatib, A., Ogbe, E., Milland, K., et al. (2015), 'We are dynamo: Overcoming stalling and friction in collective action for crowd workers', Proceedings of 2015 Conference on Computer-Human Interaction, New York: ACM.
Skule, S. (2004), 'Learning conditions at work: A framework to understand and assess informal learning in the workplace', International Journal of Training and Development, 8, 1, 8–20.
Zimmerman, B. (2006), 'Development and adaptation of expertise: The role of self-regulatory processes and beliefs', in Ericsson, A., Charness, N., Feltovich, P., and R. Hoffman (eds.), The Cambridge handbook of expertise and expert performance, 705-722, New York: Cambridge University Press.
Zimmerman, B. (2005), 'Attaining self-regulation: A social cognitive perspective', in Boekaerts, M., Pintrich, P., & M. Zeidner (eds.), Handbook of self-regulation, 13-39, San Diego: Academic Press.