Deliverable IV.I: Draft final report

Skills Formation and Skills Matching in Online Platform Work: Policies and Practices for Promoting Crowdworkers' Continuous Learning (CrowdLearn)

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Skills formation and skills matching in online platform work: Policies and practices for promoting crowdworkers' continuous learning (CrowdLearn)

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Executive summary

A growing number of Europeans are earning some or all of their income from work mediated through digital platforms. This includes so-called “crowdwork” such as online freelance work, in which self-employed workers work remotely for clients through online labour platforms, in projects ranging from data entry tasks to specialized software development and creative work.

The CrowdLearn research project examined how crowdworkers develop their skills, and how online labour platforms match skills supply with demand, with a view to drawing lessons for European skills and education policy. Data collection included interviews with 77 crowdworkers and 25 representatives of stakeholder organizations, such as platform owners, social partner associations, online learning providers, and policymakers. We also surveyed 1,001 crowdworkers, who were located across six European countries and who worked on four major online freelancing platforms. The main findings and recommendations are as follows.

Platform work and labour market integration

Platform work is often seen as a tool for labour market integration. Indeed, almost a third of the crowdworkers we surveyed in six European countries reported immigrant background, and women reported developing their skills in crowdwork more frequently than did men. However, newcomers to crowdwork reported difficulties in getting started, because they lack a record of feedback from previous clients, which is the most important way of signalling skills and trustworthiness in platform work. To address this barrier, **we propose that policy makers and platforms collaborate to experiment with subsidized “micro-internships”**, in which clients are offered a discounted rate on new and untested crowdworkers in exchange for providing feedback to workers.

Platform work is sometimes also proposed as a tool for addressing youth unemployment. However, we found that successful crowdworkers were typically highly educated and possessed significant work experience in the regular labour market prior to entering crowdwork. Therefore, **any crowdwork-based interventions into youth unemployment should invest significantly into improving young people’s digital skills and core/technical skills**, which are key prerequisites to success in crowdwork. Young people should also be educated about the risks and opportunities that freelancing entails.

Platform work and continuing professional development

People who have successfully entered crowdwork find that on-the-job skills development is an essential part of all types of crowdwork. Two thirds of the crowdworkers we surveyed reported developing their professional skills and technical skills on at least a weekly basis. In

online freelancing platforms, as in all workplaces, learning needs are closely intertwined with performance goals and driven by clients' needs and requirements. Training courses offered by conventional learning providers as well as massive open online courses (MOOCs) tend to be too long and broad for crowdworkers, and cover too many introductory-level skills. Therefore, **we recommend that informal and adult vocational learning providers develop short, focused, "just-in-time" online learning resources** to support platform workers' professional development. Crowdworkers are willing to invest time and money into developing skills which immediately help them solve problems in their current work, or expand the range of new work they can can bid for on the platforms.

We also recommend that trade unions draw on their existing resources and partnerships to extend training opportunities to online freelancers. Platform companies should support crowdworkers' on-the-job skill development by guiding clients to give developmental and formative rather than only summative feedback to the workers.

Platform work, education and vocational training

Successful crowdworkers also need skills and dispositions developed through formal education prior to entering working life. In particular, self-regulatory learning skills are a fundamental skillset not just in crowdwork, but increasingly in all 21st-century jobs. They include the ability to understand and identify changing skill requirements; to be proactive in seeking feedback; and to be self-reflective and capable of changing one's learning strategies when they are not working. Such skills are best developed from early childhood, and certainly before entering working life. Therefore, **we recommend that compulsory schooling, vocational training, and higher education should focus on developing peoples' self-regulatory learning skills, capabilities and mindsets**.

Although successful crowdworkers continue to learn new skills via on-the-job learning, in one area they experience less frequent skill development than in others: digital skills. Digital skills are mostly developed before entry into crowdwork. In countries where online platform work is less common, stakeholder interviewees argued that this was partly due to a lack of digital skills. Digital skills are also needed elsewhere in the 21st-century workplace, and **we recommend that educational policy makers continue to focus on digital skills as another priority area for formal education**.

Platform work and skills matching

A key value proposition of online labour platforms is matching skilled workers with employers in need of their skills. However, the matching mechanisms, such as reputation mechanisms that collect feedback from previous clients, are specific to each particular platform. More than half of crowdworkers we surveyed believed that they could not switch to another platform without negatively impacting their income. This limits worker mobility between crowdwork platforms and potentially also from crowdwork to regular employment, possibly

resulting in skills underutilization. To address this, **platforms should consider providing a portable portfolio function that allows workers to display, advertise, and transfer all of their qualifications, skills, and experiences across contexts**.

However, achieving such portability involves significant challenges which hamper standardization efforts, including perceived lack of a business case for leading platforms, the constantly evolving nature of skills matching systems, and data protection regulation. **We recommend that policymakers consider engaging with major platform companies to create a policy task force that examines ways of potentially overcoming these obstacles**. We also recommend that platforms should provide more stringent skill tests and/or develop ways to validate external skill test results to improve workers' ability to signal their skills.

Acknowledgements

The authors would like to thank the interview and survey participants for contributing their time and expertise to this study; Fiverr, PeoplePerHour, Upwork, and Twago for facilitating qualitative data collection; the former two platforms additionally for their continued efforts to support our survey distribution; and Gretta Corporaal, Alex Wood and Otto Kässi for their contributions to the survey questionnaire.

1. Introduction

A growing number of people are earning some or all of their income from work mediated through digital platforms, in what is variously known as platform-based work, crowdwork, and gig work, among other names. Emerging research suggests that such work is a new and increasingly important non-standard form of employment around the world, including in Europe. According to EU Commission survey data, platform-mediated work is now the main source of income for as many as two percent of adults across 14 EU member states (Pesole et al. 2018). Other surveys suggest that up to 11 percent of adults in some European countries are earning some income through such platforms (Huws et al., 2016). Platform work moreover exemplifies technology-related shifts that are also taking place in parts of the broader labour market. These include the substitution of customer feedback for line management; the use of data and algorithms in the screening, monitoring, rewarding, and sanctioning of workers; the growth of contingent work arrangements and self-employment in some countries and sectors; and the use of telework, telecommuting, and virtual teamwork practices.

Platform-mediated work can be divided into two main categories. One is location-dependent gig work, such as food delivery, transport, and manual labour. The other is location-independent online freelance work, also referred to as remote gig work or *crowdwork,*[1] which includes software development, graphic design, data entry, and almost any other work that can be delivered remotely over the Internet. According to the Online Labour Index, an experimental economic indicator that tracks project openings posted on leading crowdwork platforms, European employers increased their use of such platforms by approximately 70 percent from mid-2016 to early 2019 (Kässi & Lehdonvirta 2018). Some of this increase in crowdwork can probably be attributed to supply-side factors, such as workers seeking flexibility and new income sources. Much of it can also be attributed to demand-side factors, such as firms seeking to use online labour platforms to achieve cost savings, flexibility, and access to specialized skills (Corporaal & Lehdonvirta, 2017). In particular, online labour platforms allow small- and medium-sized enterprises (SMEs) to access labour and skills beyond their local labour markets, which could help them grow further.

The types of work transacted on crowdwork platforms represent a full spectrum of skills, from advanced data analytics and software development to data entry and data labelling tasks (Kässi & Lehdonvirta 2018). However, as a context for skills development and the matching of skill supply to demand, crowdwork differs radically from standard employment. First, standard employees can expect their employers to provide them with training as new technologies enter the workplace, helping to keep the European workforce's skills up to date. In contrast,

[1] In this report, we use the term *crowdworkers* synonymously with *platform workers, online freelancers* and simply *workers* to refer to people who find work via online labour platforms. The term 'crowdworker' is used in parts of European academic and policy discourse, while the workers themselves prefer terms such as 'freelancer'. Different online labour platforms also have different ways of referring to their workers, with Fiverr for instance using the term 'seller'. The terms carry slightly different meanings and connotations in different communities, but in this study we are using them interchangeably.

crowdworkers appear to be responsible for their own learning and skill development (Margaryan, 2019a; 2019b), and it is not clear how they deal with this responsibility. Is skill development side-lined, or are workers adopting new, digitally-powered and work-integrated learning practices? Are platform companies or other institutions in the online labour market supporting them in any way? The second difference between crowdwork and standard employment is that, in standard labour markets, publicly regulated qualification systems play an important role in matching skills supply with demand. But in the online labour market, skills matching appears to rely on crowdwork platforms' proprietary data and matching systems (Lehdonvirta et al. 2019). There is a lack of clarity over what these systems are, what evidence there is about their efficacy, and what implications they have for the portability of skills across contexts.

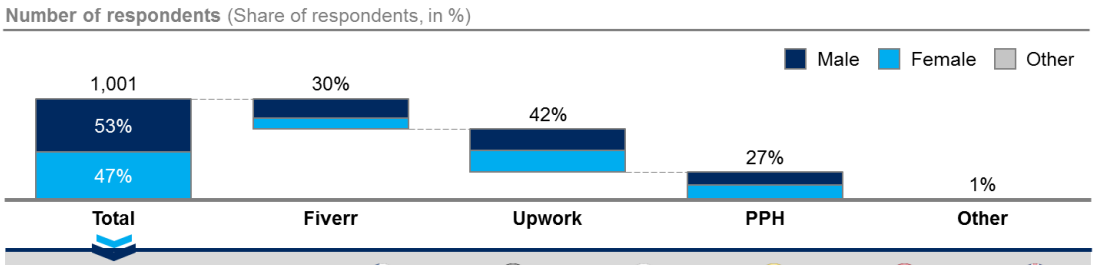
The purpose of the CrowdLearn research project was to address this gap in our understanding of skill development and skills matching in crowdwork and to consider the implications for policy on European skills and education. Since crowdwork represents a radical departure from the standard model of employment, the standard tools of skills and education policy – the tools used by European policy makers to address skills gaps, skills mismatch, digital skills, and other issues – may not always be applicable in this new context. New tools may be needed, and since crowdwork exemplifies trends visible in the broader labour market, policy lessons from crowdwork may also be useful in informing future European skills policy more generally.

The research was structured around the following research questions (RQs):

- *RQ1:* What skills do crowdworkers develop through their work on online platforms?
- *RQ2:* What are the learning processes – both individual and social – through which crowdworkers develop skills; in particular what types of workplace learning activities and self-regulatory learning strategies do they use to develop these skills?
- *RQ3:* What, if any, differences are there in learning practices and skill development between different types of workers and between different national contexts in which platforms operate?
- *RQ4:* How and to what extent do platform markets currently promote effective *(a)* development and *(b)* utilisation (matching) of crowdworkers' skills; in particular through what formal and informal certification practices, or other types of support for learning, development, and skills matching?
- *RQ5:* What are the challenges of facilitating inter-platform recognition and portability of crowdworkers' skills?
- *RQ6:* How can skill development and matching in online platform work be improved; in particular what design and policy recommendations can be made to improve these?

In a previous publication (Cedefop, 2019) we reviewed the scholarly and policy literature on these questions, identifying significant gaps in knowledge. In this report, we add findings from our original empirical research, using a mix of qualitative and quantitative methods, to address these questions. The qualitative component of the research project

consisted of interviews with 77 European crowdworkers and 25 representatives of stakeholder organizations, including online labour platforms, policymakers, and trade unions/associations, as well as publicly available materials on platforms' provisions for learning and other supplementary data. The quantitative component consisted of an online survey of 1,001 crowdworkers across four major platforms. Crowdworker participants of the interviews and the survey were required to have been engaged in online freelancing from one of six European countries, exemplifying different types of labour market regimes and welfare state models: the United Kingdom, Germany, Italy, Spain, Romania, and Finland. A detailed description of the survey and interview methodologies can be found in the appendix (section 7.1). An overview of the survey sample is presented in Figure 1.



Primary project category																				
Creative & Multimedia	28%	9	13	0	18	11	0	32	22	0	20	10	0	12	12	0	66	49	2
Writing & Translation	31%	17	29	1	20	27	0	20	40	0	6	14	0	15	20	0	35	61	1
Software Dev & Technology	12%	7	1	0	16	2	0	13	0	0	14	8	0	9	3	0	40	8	0
Sales & Marketing	10%	5	5	0	7	5	0	10	9	0	9	7	0	7	4	0	20	8	0
Clerical & Data Entry	9%	1	3	0	2	5	1	3	5	0	5	6	0	5	8	0	18	28	0
Professional Services	8%	3	0	0	10	7	0	9	4	0	7	8	0	7	4	0	17	9	0
No data	3%	0	0	0	2	3	0	1	1	0	1	0	0	2	2	0	10	5	0
	1001	42	51	1	75	60	1	88	81	0	62	53	0	57	53	0	206	168	3
		9%			14%			17%			11%			11%			37%		

Figure 1: Survey sample

The largest numbers of survey respondents were working from the United Kingdom (37%), Italy (17%) and Germany (14%). Roughly half of our respondents were women (47%). When asked to indicate their primary job category, the greatest proportion of respondents selected Writing and Translation (31%), followed by Creative and Multimedia (28%), and Software Development and Technology (12%).

In this report, we present answers to the research questions as follows. In section 2.1 we examine what skills crowdworkers develop in platform work (RQ1) and the differences in the types of skills developed between different types of workers (e.g. occupation and level of engagement with crowdwork) and between national contexts (RQ3). In section 2.2, we

examine what learning processes, in particular workplace learning activities (WLAs) and self-regulatory learning (SRL) strategies, crowdworkers have adopted, and what differences there are between types of workers and national contexts (RQ3) with regards to learning activities and strategies. In section 3, we shift focus to institutions such as platform companies and learning providers, investigating what role they are currently playing in crowdworkers' skill development (RQ4a). In section 4, we examine what mechanisms these institutions are providing for skills matching in online labour market (RQ4b). In section 5, we consider the implications of these mechanisms for the portability of crowdworkers' skills across different platforms (RQ5). Finally, in section 6, we synthesise our findings into recommendations to European policymakers, platform companies, and other stakeholders concerned with skills development and the effective matching of crowdworkers' skills to demand.

2. Findings on skills and skill development in crowdwork

2.1. What skills do crowdworkers develop?

In this section we are concerned with the question of what skills crowdworkers develop through their work on online platforms (RQ1). We addressed this question as follows. Based on interviews with crowdworkers, we developed a typology of skills involved in crowdwork. The typology distinguishes between those skills that are learned prior to joining a platform and subsequently applied in the platform work, and those skills that are developed in and through platform work. We then used our survey of crowdworkers to validate the typology and to examine what differences exist in skill development between different types of crowdworkers and different national contexts.

2.1.1. Skills developed and applied through crowdwork

Table 1: presents the top-level categories of our typology of skills developed in crowdwork and some illustrative examples.

Table 1: Top-level categories of our typology of skills developed in crowdwork

Number of mentions of skill category; developed prior to during crowdwork

Skills typology	Examples	prior to	during
Technical/core skills	▪ Computer programming, marketing	228	265
Language skills	▪ English, French, Spanish	61	18
Computer literacy		7	
Communication skills	▪ Communication skills, handling customers	51	112
Organizational skills	▪ Project management, time management	8	56
Personal dispositions/attributes	▪ Independence, confidence, creativity, resilience	18	89
Learning to learn		1	39
Analytical skills		1	
Setting up as a freelancer	▪ Taxes, obtaining business permits		28
Obtaining work on platform	▪ Pricing, applying for work	17	177

The full typology with 123 distinct skills learned before joining the platform and 89 distinct skills learned during crowdwork can be found in the appendix (section 7.2). Overall, the typology incorporates many of the types of skills that have been known from the literature to be developed through on-the-job, workplace learning. However, one key finding is the extent to which workers focus on the development of technical/core skills in their on-the-job learning. Conventional educational and training literature tends to view technical/core skills as the domain of formal training, claiming that new technical skills are developed through formal training and subsequently honed and contextualised through applying these in the workplace. This conventional view has been critiqued and empirically invalidated within the literature on workplace learning. Our findings therefore provide further evidence that workplace is a legitimate and powerful space of learning where important new core skills are developed rather than only applied.

Furthermore, our study has two novel findings regarding freelancing-specific skills categories which have hitherto not been reported in the literature on skills: *Obtaining work on a platform* and *Setting up as a freelancer*. The first one comprises skills required to successfully navigate the unique environment of platform-based work, in terms of mastering platform user interfaces, optimizing one's profile to appear frequently in search results, reading the market to pitch and price one's services appropriately, and other skills. The second one comprises skills necessary for operating as a self-employed person more generally, such as registering as a business and dealing with finances and taxation.

Figure 2 reports the share of respondents who are developing skills belonging to each of the skills categories at least on a weekly basis during crowdworking. In addition, proportions are presented for skills used in platform work but developed prior to joining the platform.

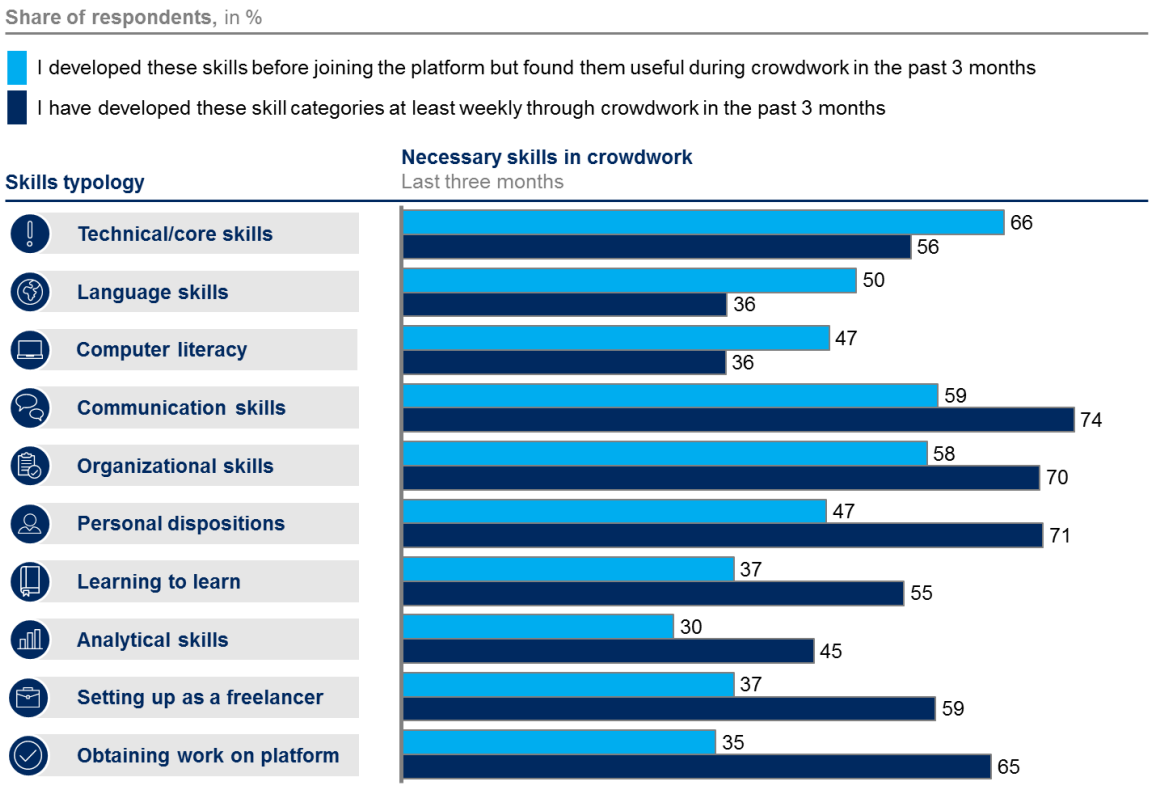


Figure 2: Necessary skills for crowdwork developed prior to and during online platform work.

The figure indicates that technical/core skills, communication skills, and organizational skills are being developed before entering crowdwork by the majority of respondents. The same is true to a slightly lesser extent of language skills, personal dispositions, and computer literacy. These findings suggest that prior education, training, and/or work experience provide a baseline level of marketable core skills and professional skills necessary in platform work. The highlighted importance of professional skills aligns well with recent research on the changing nature of work online that underlines the importance of such skills (Vazquez et al., 2019). The above findings have implications for discussions on the suitability of online labour platforms for labour market integration. Our data suggests that, like in conventional workplaces, less experienced workers are at a disadvantage. Workers with more than three years of general work experience reported more than one additional marketable skill before joining the platform than novices with less than a year experience. For technical core skills this implies that two thirds of the experienced cohort draw on existing knowledge during crowdwork compared with only about half of novices who do.

That said, large proportions of respondents also reported developing skills during crowdwork itself. It is apparent that on-going skill development is common among crowdworkers, with many respondents reporting some development of the presented skill categories on a weekly or daily basis. In fact, only less than two percent of respondents appeared not to develop any of the skill categories over the past three months. For those skills that are being improved during crowdwork, our respondents on average reported developing

them slightly less frequently than on weekly basis. On the one hand, crowdworkers appear to be more likely to develop their professional skills, for instance how to communicate with clients, ways to self-organize or their professional attributes, as well as platform- and freelancing-specific skills. These skill categories appear to be an elementary part of crowdwork. Between a fifth to a third of respondents indicated that they develop organizational and communication skills, their personal dispositions, and both platform and freelancing-specific skill categories through their project work on a daily basis. On the other hand, technical or core skills, foreign language proficiency, analytical thinking and digital literacy are among the relatively less frequently developed skills. Only about 15 percent of freelancers stated developing such skills through their platform work on a daily basis, compared to majorities who reported developing them on weekly basis. Skill development appears to be most frequent in the second and third year of crowdwork suggesting a possible potential plateauing of learning intensity of crowdwork.

Figure 3 depicts the share of respondents who deliberately invested time in developing or improving a specific skill category in the past month. This number can be interpreted as a proxy for crowdworkers' current learning foci and identified skill gaps. The categories where respondents are currently focusing their skill development during crowdwork are technical/core skills and communication skills. 59% and 42% of workers respectively reported having taken time to improve these skills last month. This finding aligns well with the observation from our interviews that crowdworkers are very much concerned with cost-benefit calculations, especially when proactively investing time or money into learning. Development in either of these skill categories has the potential to produce an immediate return on investment through additional and potentially better paid projects becoming available to the crowdworker, or better reviews resulting from better project results or communication. For categories that are being actively improved by only a small proportion of workers, especially computer literacy, it may be that people who enter crowdwork have already reached a satisfactory level of competence and see less need for further skill development. Similarly, it might be less obvious to a freelancer if and how they may improve more abstract skill types such as analytical thinking or learning to learn. These are meta-cognitive skills and therefore many people may not be explicitly aware that they are developing such skills in their everyday work; the types of survey and interview methodologies we used in this study cannot help analyse such meta-cognitive learning processes. Personal dispositions may also be perceived as part of one’s personal-psychological structure largely becoming set earlier in life and/or during one’s education making them less central to one’s everyday workplace learning activity.

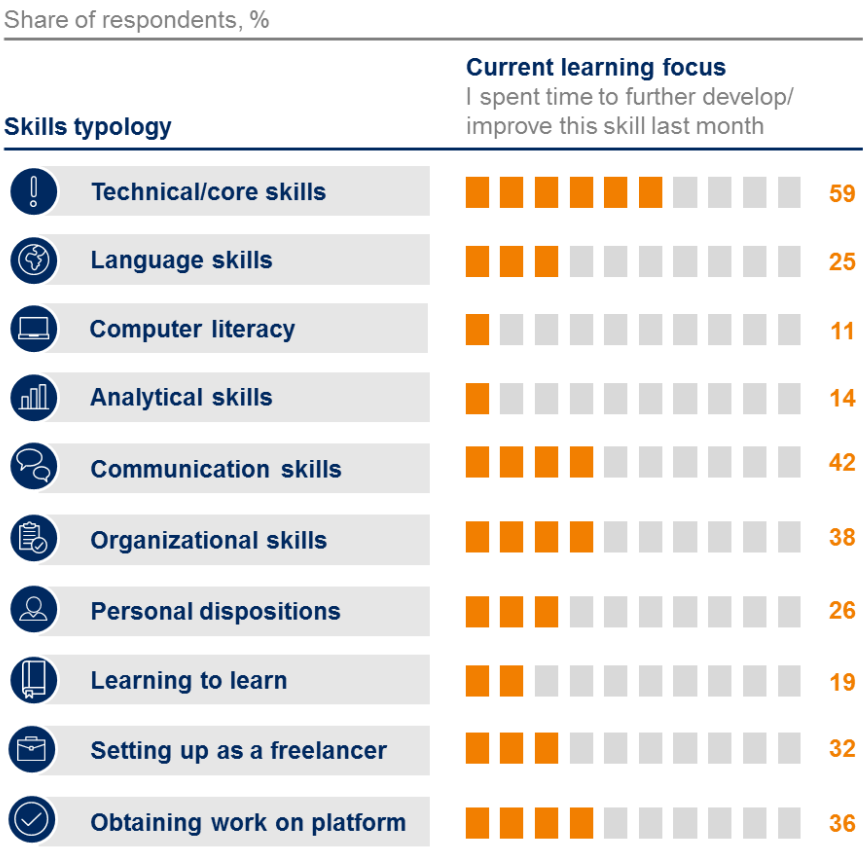


Figure 3: Crowdworkers' learning focus in the past month (i.e. skill groups they have actively spent time on developing or improving)

2.1.2. Differences in skill development between types of workers and countries

The survey data we collected also allows us to examine how various types of workers and workers in different social and national contexts may differ when it comes to skill development in crowdwork (RQ3). The average frequency of skill development across our skill typology differs for various types of workers (Figure 4).

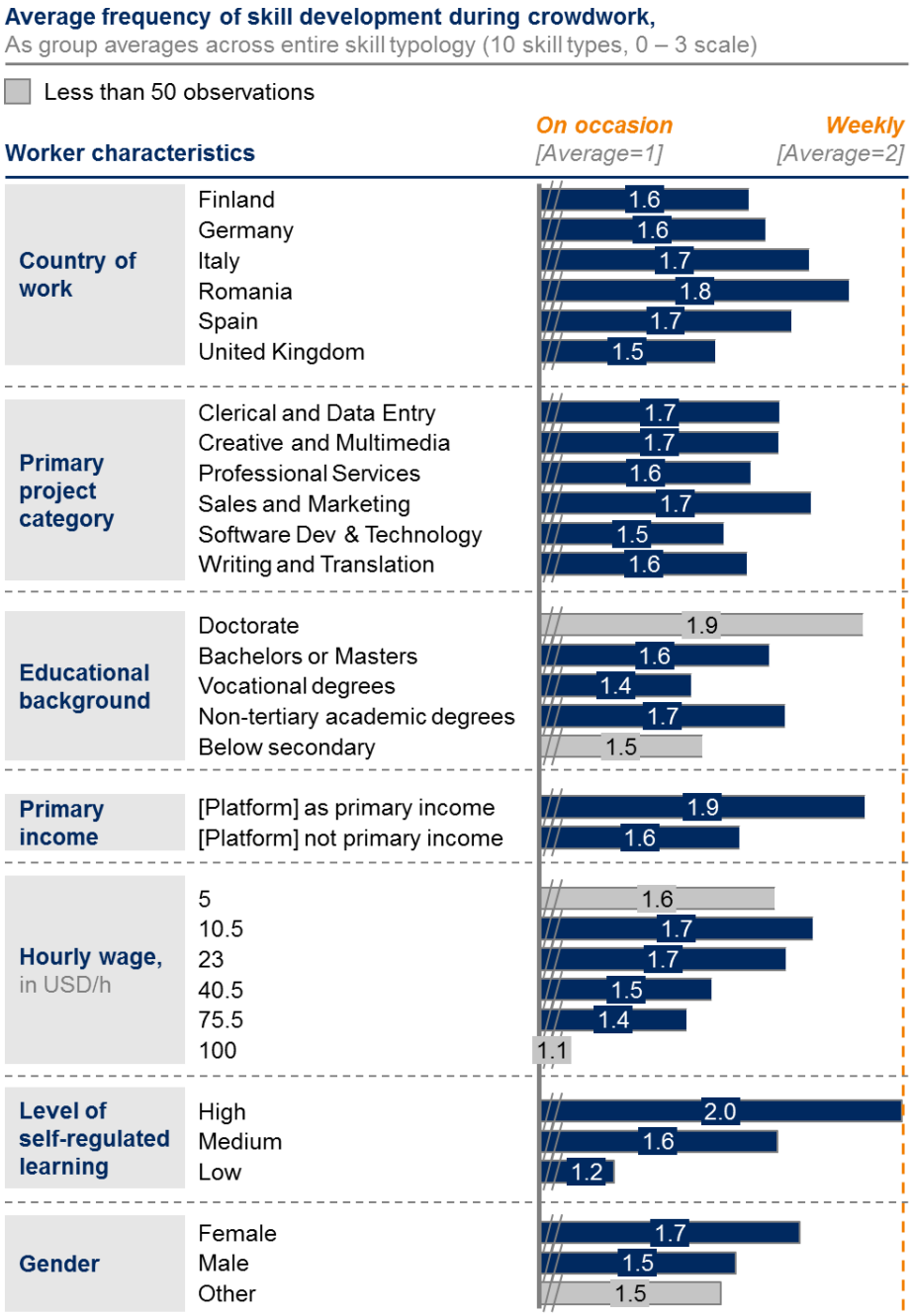


Figure 4: Average frequency of skill development by selected worker characteristics

Those workers who spend more time on a platform, for instance those for whom their work on the platform is a primary source of income, reported a higher average frequency of skill development over the past three months.

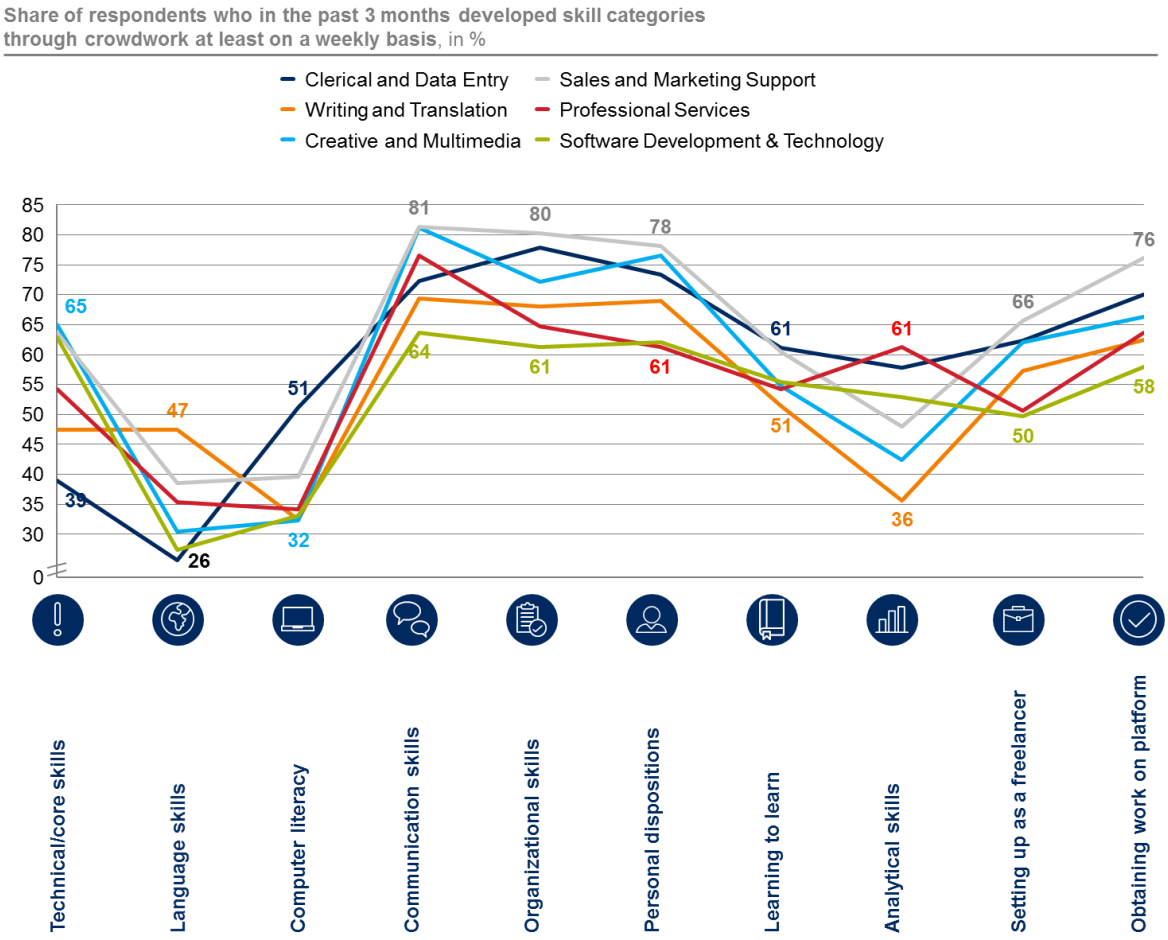


Figure 5: Differences in frequency of skill development by skill category and primary project category

Raw frequencies of skill development differ only marginally by primary project category, that is the type of work primarily undertaken on the platform. Moving from this raw quantity of skills development to the types of skills being developed, varying foci of skill development are apparent between occupational groups (Figure 5). For instance, language skills are being less frequently developed than other skills among crowdworkers in general, but relatively more frequent among respondents who write or translate online as their primary project focus. Creative and multimedia workers and those primarily active in sales and marketing reported developing their communication skills more frequently than most other groups. This could reflect a need to communicate more frequently and in greater detail with clients to understand their desired creative output or their corporate brand or strategic goals to be achieved through marketing or sales projects. Crowdworkers in fields with relatively higher levels of task complexity such as software and technology development or relatively more opportunities for on-the-job learning such as creative and multimedia work are reporting more frequent development of their technical/core skills more frequently than those active in less complex and routine project categories such as clerical work and data entry.

While for the most part computer literacy skills were developed prior to starting crowdwork, more than half of clerical and data entry workers continued to develop these skills throughout their time working on a platform on at least a weekly basis. The same holds true for analytical and learning-to-learn skills. One possible reason for this could be that these workers have on average the lowest baseline level of these skill categories, as this category of work is less dependent on formal education or prior work experience. For computer literacy, another possible reason is that workers focusing primarily on clerical and data entry benefit more from rapid typing skills and operating the computer fluently, as the work is typically paid on a piece-rate basis (Lehdonvirta, 2018).

The frequency of skills development in crowdwork also differed between workers located in different countries (Figure 4). An overall pattern is that, across most skill categories, a larger share of those crowdworkers located in countries with relatively lower average incomes (Romania, Italy, Spain) reported more frequent skills development than crowdworkers located in countries with relatively higher average incomes (Finland, Germany, UK). This trend is shown in Figure 6 and further evidenced by data from our qualitative crowdworker interviews suggesting that this may be due in part to people in countries with relatively lower average incomes entering crowdwork with relatively less prior relevant work or formal education experience, thereby requiring them to develop skills important to crowdwork either on-the-job or in between gigs. Other stakeholders also suggested that in countries such as Finland there is a greater emphasis on teaching relevant skills such as digital literacy as part of formal education. Our survey data support this potential explanation for some skill categories like communications and digital literacy, but not for others (e.g., technical/core skills). Another possible explanation is that workers from lower-income countries are more dependent on their platform work and thus more motivated to maintain and develop their platform-relevant skills than counterparts from richer countries with better local labour market opportunities and welfare systems. Also, workers from lower-income countries face greater hurdles in winning projects and may thus have to work harder to hone and prove their skills (Lehdonvirta et al, 2019), a point echoed in some of our interviews with workers from Romania, Italy, and Spain.

Differences between national contexts are also apparent in the types of skills crowdworkers reported developing. UK-based workers were significantly less likely than participants from other EU countries to report developing their language skills. This is unsurprising given that the largest online labour platforms operate in English, and that most clients are also located in English language countries (Kässi & Lehdonvirta, 2018). A lower proportion of workers in Finland and Germany develop their computer literacy skills daily or weekly, while Spain-based and Romania-based workers were more likely to be in the process of developing their language skill set.

Prior research has shown that people in Finland (69 percent) and Germany (68 percent) have higher rates of basic digital skills compared to other EU member states (such as Spain,

at 53 percent).[2] Germany-based workers reported developing their analytical skills less frequently compared to workers based in Romania. There are various possible explanations for this, including higher rates of employment and graduation from tertiary education in Germany.[3]

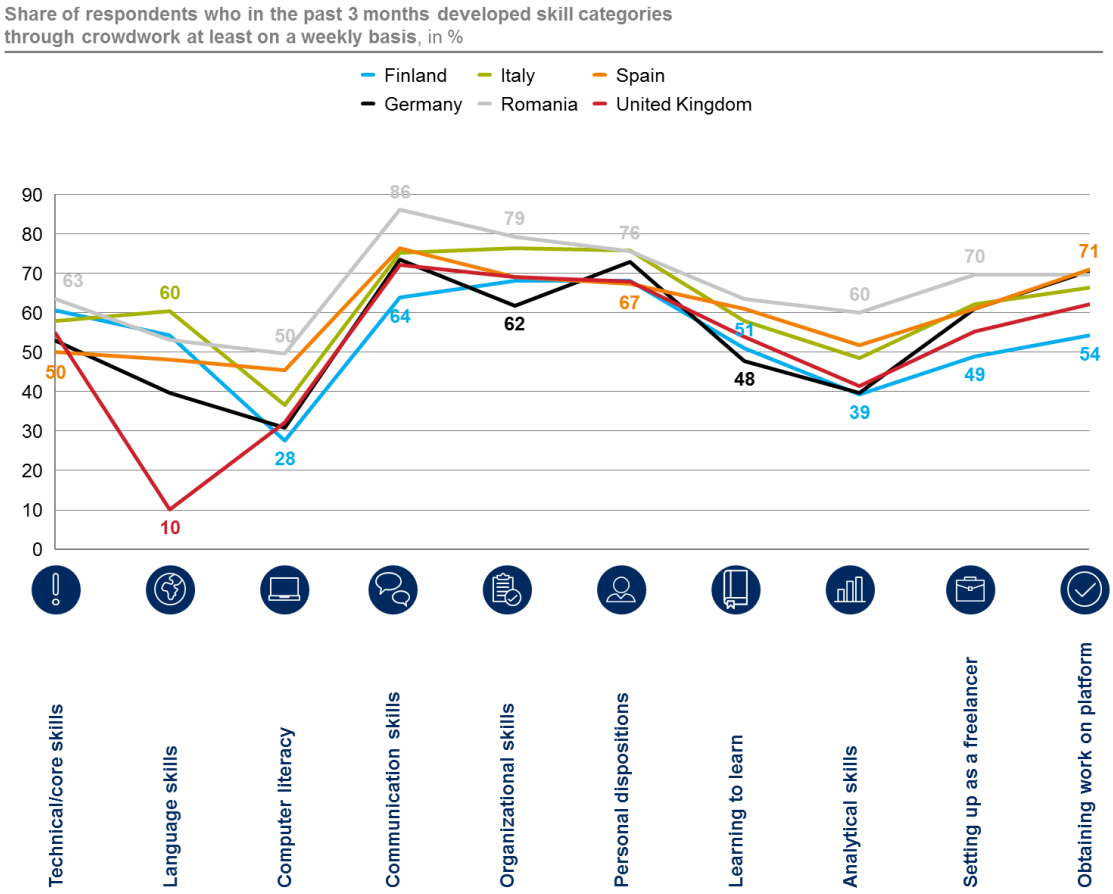


Figure 6: Differences in frequency of skill development by skill category and location of work

There are also gender differences in skills development during crowdwork. Women in our survey sample were overall more likely to report developing their skills during crowdwork than men were (Figure 4). Respondents identifying as neither male nor female were too few to examine statistically and have not been included in the gender-based analyses. The largest differences between men and women in skill categories respondents worked on a daily or weekly basis are observable in the skills relating to organisational abilities and personal dispositions. Women's greater emphasis on learning during crowdwork is unlikely to be explained simply by lower baseline skill levels, because, compared to men, women in our sample on average had more formal education and more years of prior work experience – both

[2] https://ec.europa.eu/digital-single-market/en/news/digital-skills-gap-europe

[3] https://ec.europa.eu/eurostat/statistics-explained/index.php/Tertiary_education_statistics

in crowdwork and regular employment (Figure 7). Women crowdworkers' greater emphasis on developing communication and other non-technical skills could be explained in part by women's overrepresentation in writing and translation work in our sample. Overall, among other potential explanations to be further researched, these patterns may suggest that women crowdworkers may be more motivated to hone their skills to successfully compete with others in crowdwork. Recent research suggests that significant gender disparities exist in online platform work, including among European platforms and workers, whereby women tend to request lower rates but obtain more hours of work (Gomez-Herrera & Mueller-Langer, 2019).

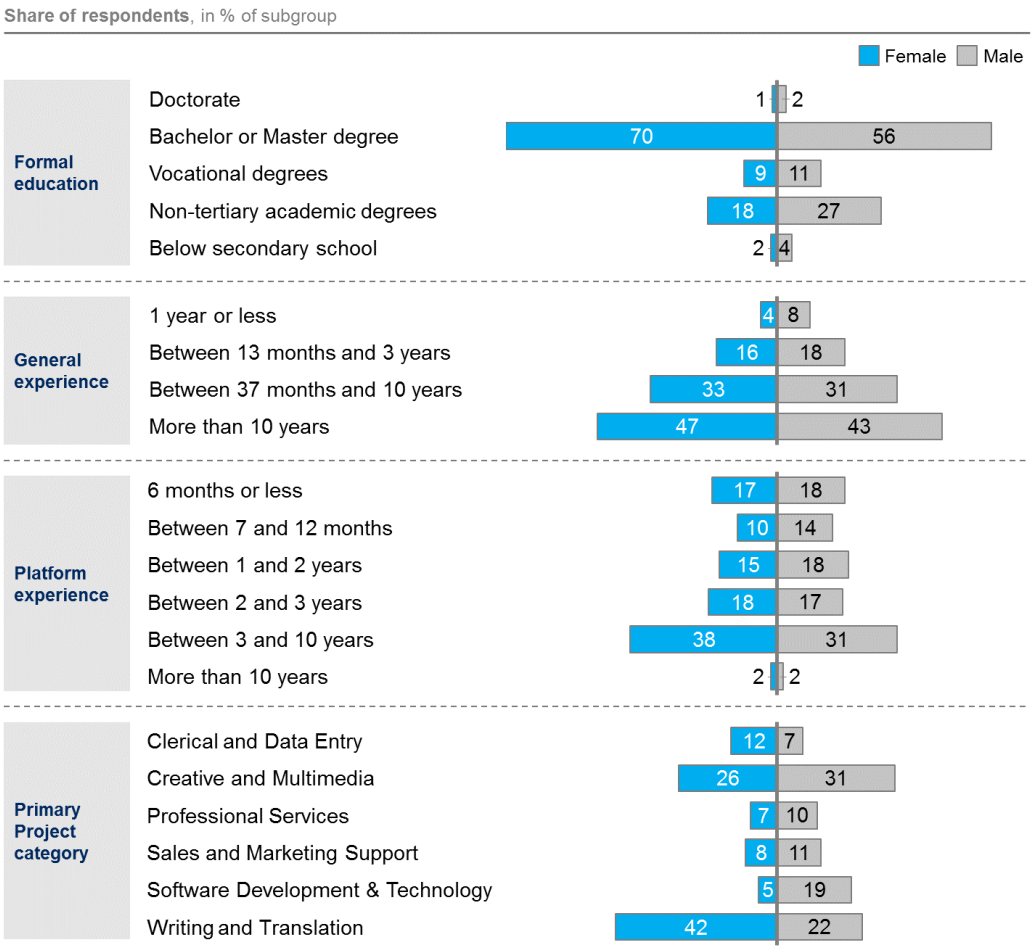


Figure 7: Education, work experience and primary project categories by crowdworkers' gender

Additionally, Figure 4 suggests that crowdworkers with a vocational degree as the highest degree they have obtained (n=100) engage least frequently in skill development during their online projects. Almost 60% of those workers with a vocational background engage in either writing and translation or creative and multimedia work. The majority of these workers are men (60%) and on average 38 years of age, making up the oldest sub-group. While these respondents reported a slightly lower than average propensity to self-regulate their learning, their above average levels of experience and hourly wage suggest that these workers are

already relatively specialised and subsequently may have higher opportunity costs attached to skill development. An alternative explanation could be a decreasing focus on skill development with increasing age, an observation we make more generally for the frequency of skill development but also the application of workplace learning activities or self-regulated learning strategies.

In terms of the self-regulatory learning orientation, our findings suggest that crowdworkers with a high self-regulated learning (SRL) disposition score (as measured through a methodology outlined in Littlejohn, Milligan, Fontana and Margaryan, 2016) actively developed their skills more than those with a medium or low SRL score. This was true across all skill types, suggesting that the SRL ability is critical in order for crowdworkers to develop and maintain those skills that are important for online platform work.

Lastly, the current learning focus — defined as actively spending time on improving a skill category last month — is influenced by worker characteristics. As visible in Figure 3, most crowdworkers invest time to improve their technical/core, their communication or organizational skills. Considering primary project categories, we observe that a regular focus on improving skills is the highest in creative and multimedia, and software and technology development. More than three-quarters of respondents in these sub-groups reported having developed their core expertise in the previous month. There are several possible explanations for this finding. On the one hand, both of these sub-fields can be argued to be subject to more rapid technological development than the other project categories in our sample. On the other hand, adding new and potentially adjacent skills to an existing skill set may be perceived to immediately unlock new revenue streams in the form of previously unattainable client requests.

More than 40% of workers active in clerical or data entry projects reported spending time on improving their skills in obtaining platform work. As such, this skill is second only to core/technical skills for this particular sub-group of workers. Given the relatively lower complexity of tasks comprising most of clerical or data entry projects, the need to improve in gaining projects online could reflect larger competition for such projects.

Unsurprisingly, only a small proportion of workers based in the United Kingdom reported having developed their language skills in the same time horizon, reflecting that the main language used by the platforms' user interfaces, worker profiles, and client communications on all the platforms we surveyed is predominantly English.

While we generally observe lower relative levels of learning with increasing age, almost 30% of the over 60-year olds actively improved their digital literacy last month compared with a sample average of 11%. A possible explanation is that these workers have had relatively less exposure to digital technology throughout their life and therefore must consciously spend time to stay up-to-date with technological advances in crowdwork or their field of expertise more broadly.

2.2. Ways of learning in crowdwork

In this section we examine the learning processes through which crowdworkers develop skills during their work (RQ2). In particular, we are interested in examining the workplace learning activities and self-regulatory learning strategies they use to develop the skills discussed in the previous section. Our strategy was as follows. We first adopted a typology of learning activities and strategies, based on an extant survey instruments, the Self-regualted Learning at Work questionnaire, SRLWQ (Fontana et al, 2015). We further tested this typology by using it to structure the questions for a part of our crowdworker interviews. The typology is presented in the appendix (section 7.3). The typology was then used in our crowdworker survey questionnaire to scope and measure the prevalence of these activities and strategies in crowdworkers' learning practices.

Some overall findings can be summarized as follows. Crowdworkers' learning goals tended to be self-initiated and motivated by personal interest, a desire to remain competitive (e.g. by acquiring skills listed in other freelancers' profiles), and a desire to complete new types of crowdwork tasks (e.g. by acquiring skills listed in job postings). The learning activities reported by crowdworkers were generally individual, but included some social learning activities were also used by workers. To source knowledge and resources for learning workers most frequently used free, online resources which were most often discovered by searching using keywords on Google or YouTube. Resources used ranged from specific questions and answers (e.g. on the Q&A website Quora), to multi-video tutorials on YouTube, to step-by-step guides on blogs, and Massive Open Online Courses (MOOCs).

Time was a significant constraint on learning activities for the freelancers interviewed, as most either freelanced full-time or balanced freelancing with offline work, formal education, and/or caring responsibilities. This pressure further directed the freelancers we spoke to away from formal education towards informal, flexible learning, such as learning on-the-job. Stakeholders, especially corporate clients of platforms, told us that if the price of the work was high, they would not expect freelancers to undertake any on-the-job, trial-and-error learning but to come equipped with all the necessary expertise. Cost and the relevance of online learning materials — linked to time, and the importance of only spending time on necessary or particularly interesting learning — were also important considerations for crowdworkers.

In the following subsections we dive deeper into crowdworkers' learning activities and learning strategies, and examine differences between different types of workers (RQ3).

2.2.1. Workplace learning activities

As a starting point for our survey questionnaire, we used a set of workplace learning activities (WLAs) introduced by Fontana et al. (2015). The 15-item scale is structured around individual and social, as well as formal and informal workplace learning activities, some of which overlap. Overall, the survey findings suggest that the average crowdworker appears to primarily undertake informal rather than formal workplace learning activities, and to prefer individual WLAs over social ones (Figure 8).

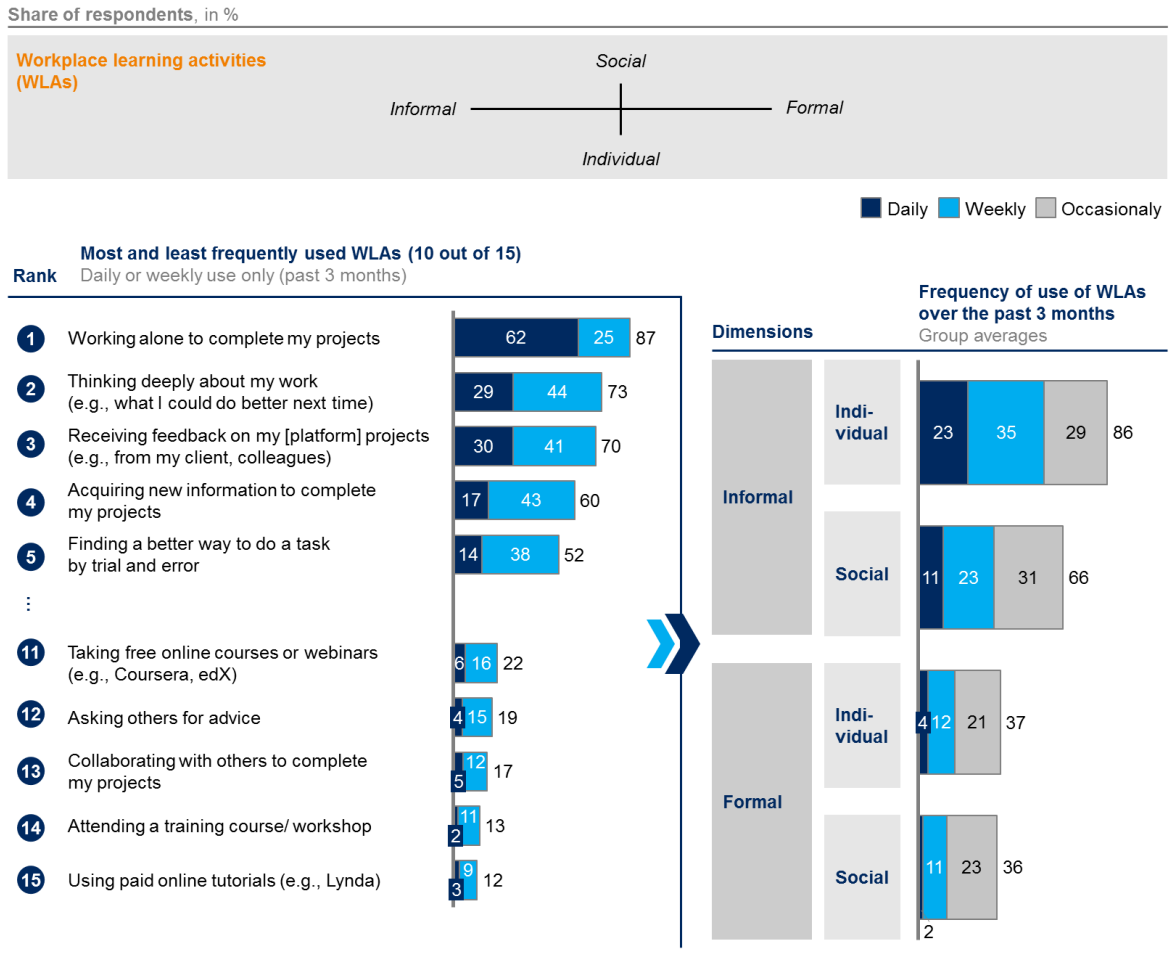


Figure 8: Summary of crowdworkers' workplace learning activities (the typology of WLAs is adapted from Fontana et al, 2015)

Online platforms as workplaces seem to encourage individual learning activities, possibly partly because of the way in which the platform tasks are designed whereby complex interdependences inherent in organisational jobs are, in crowdwork tasks, quite deliberately designed out of the workflow. With regards to the workplace learning activities (WLAs) listed in Figure 8, almost two-thirds of workers reported learning by working alone to complete their projects on a daily basis. Similarly, crowdworkers reported that they frequently, that is at least

weekly, reflect deeply on their work (73 percent), acquire new information to complete their projects (60 percent), and find a better way to do a task by trial and error (52 percent). One notable exception is the social workplace learning activity of receiving (presumably client) feedback on completed project work (70 percent). From a skill development perspective, it could be beneficial to complement the current public, and mainly evaluative and summative, client feedback culture with private developmental and formative feedback to freelancers. Platforms could assist by including such private feedback as a standard option at the end of each project and assisting clients with a small number of standardized guiding questions to help them structure their feedback.

Social workplace learning activities beyond seeking and receiving feedback are less commonplace. Only 17 percent of respondents collaborate with others to complete their work on a regular basis, i.e. at least weekly. Similarly, only a small proportion of crowdworkers regularly ask others for advice (19 percent), observe and replicate other people's strategies (34 percent) or learn from online community fora (31 percent). Given that online feedback culture was originally formalized by integrating it into the workflow of online platforms and their technological infrastructure, it remains a question for further research whether the same could be achieved for other social and collaborative learning activities.

The individual, geographically-dispersed and task-based nature of crowdwork decreases the relevance of formal learning activities such as physically attending training courses or workshops. 64 percent of survey respondents reported that they have not undertaken any formal learning in the past three months. Notably, the uptake of paid online courses, webinars and tutorials appears to be equally low, with 74 percent of respondents saying they had not engaged in such a learning activity recently. Free online courses or webinars appear to be an exception, however, with a fifth of crowdworkers having attended a free course at least weekly. Still, more than half of our sample did not make use of such offerings at all. This again supports our qualitative finding that crowdworkers critically evaluate formal training offerings with respect to monetary cost, but also the necessary time investment.

The most frequently used workplace learning activities may also reflect some of the specificities of each occupational group. Occupational cultures and the nature of work tasks may be some of the key factors influencing the learning activities most frequently undertaken by a worker and further research is required to elucidate and analyse the relevant factors. To illustrate this point, a short comparative summary of the tasks and learning activities of those primarily active in writing and translations, and those in software and technology development, best illustrates the task-specific nature of learning (Figure 9).

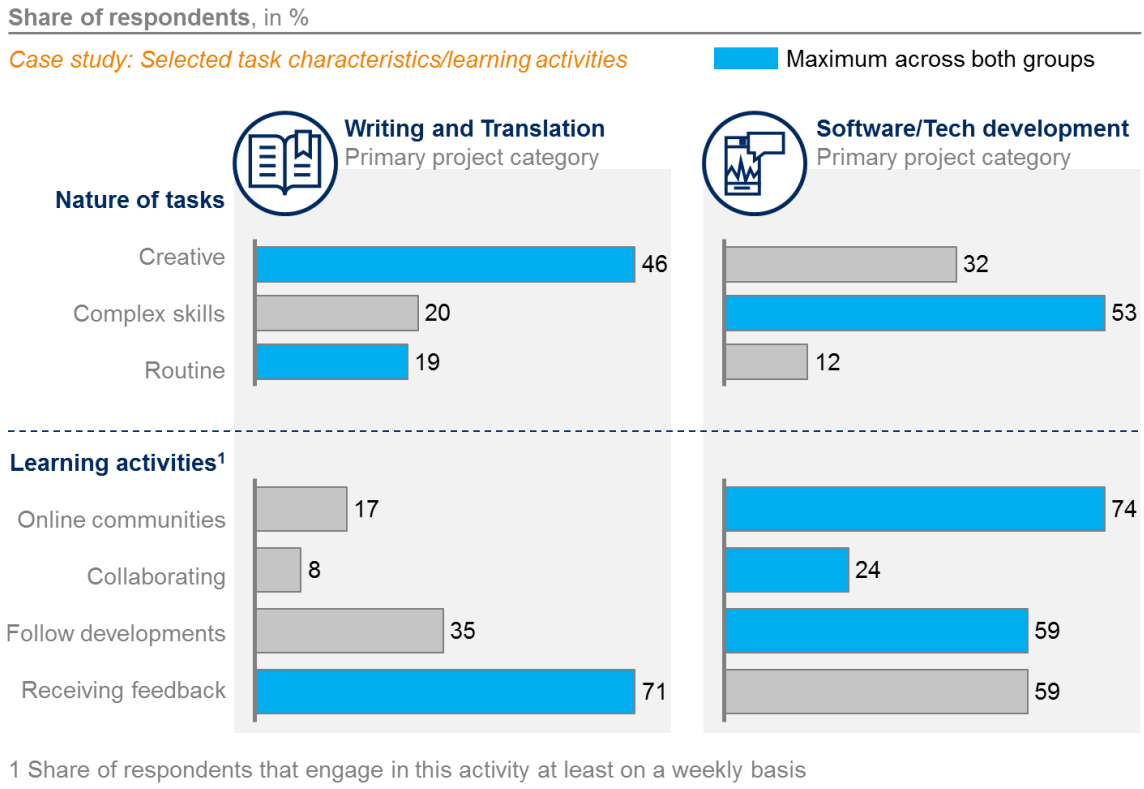


Figure 9: Comparison of selected variables on the nature of tasks and use of WLAs grouped by crowdworkers primarily active in writing/translation projects and those in software and technology development

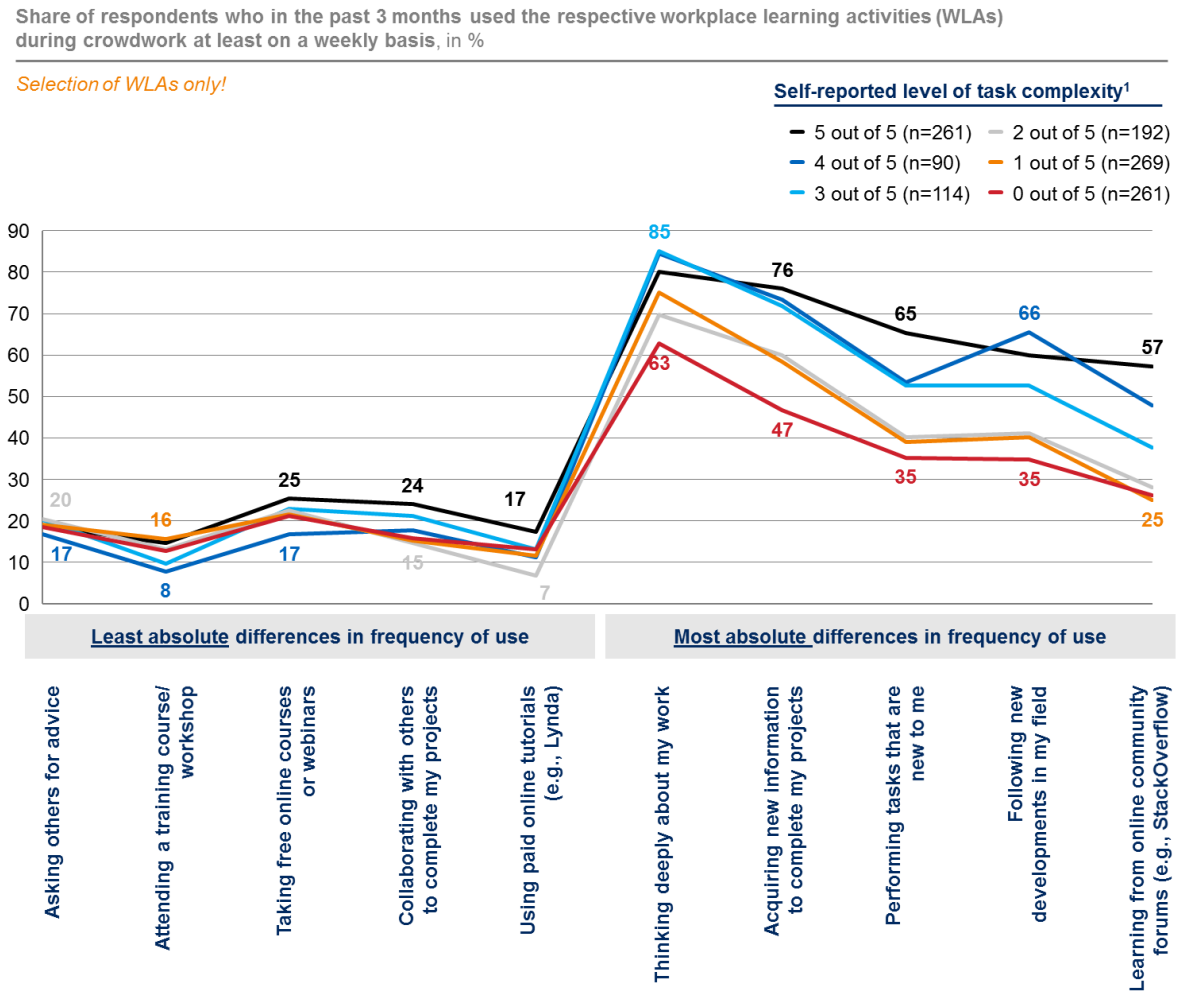
Our survey data indicate that these groups of crowdworkers are required to fulfil tasks with often different demands. Our survey suggests that in writing or translation, tasks are 14 percentage points more likely to be considered creative, but also 7 percentage points more likely to be viewed as routine than in software and technology development. At the same time, those active in the latter project domain were relatively more likely to highlight the need for complex skills (33 percentage points difference), but also specific expertise, the ability to deal with new problems, collaboration and unique solutions to completing their tasks. Unsurprisingly, learning activities differ considerably.

Those primarily active in writing or translation, for instance, spend less time on social learning activities than do all other occupational groups, including software and technology development. Only eight percent of workers in this subsample noted that they collaborate with others on at least a weekly basis. Fourteen percent regularly ask others for advice, and 16 percent make frequent use of online communities or fora, which is further supported by interview data that many individuals enter crowdwork in order to benefit from its distinct style of work (e.g. asynchronous, remote, self-directed, self-paced, etc.). At the same time, the need to keep up with newest developments in the field appears to be relatively low, which may also be a factor in why communal learning is uncommon for this group. Only 35 percent in this

subgroup follow new developments in the field on a regular basis, and 36 percent read books or attend more formal learning offerings such as trainings/workshops (6 percent), or paid (4 percent) and free online courses (11 percent).

In comparison, those who are predominantly active in software and technology development appear to engage primarily in learning activities that help them stay updated on new information regarding their field of expertise, which is reflected by a larger share of this subgroup following new developments in the field (24 percentage points higher), performing previously unknown tasks in their projects (22 percentage points higher) or reading relevant literature (17 percentage points higher) at least weekly. Overall, changes in sector norms, trends, and tools require more frequent upskilling and reskilling to maintain the employability of those working in software and technology development. Crowdworkers in technology development are also much more likely to engage in social learning activities such as seeking assistance in online fora (74 percent) or collaborating with others (24 percent) on at least a weekly basis, which may be reflective of traditional collaborative and agile working cultures in this occupation. In addition, this sector has a longer history of online freelancing compared to other sectors. As a consequence, it may be unsurprising that online communities like *stackoverflow.com* may be better developed and more frequently accessed. Crowdworkers in other sectors may find online communities as useful if they were as developed and ubiquitous.

Figure 10 outlines the relationship between self-reported task complexity and the frequency of engagement with several workplace learning activities.



1 Respondents were asked about the nature of their tasks in terms of (1) complexity and (2) variety of skills needed to complete them, the (3) necessity for unique answers, (4) the lack of obviously correct solutions and (5) their novelty.

Figure 10: The relative frequency of use differs by self-reported level of task complexity

With the exception of some social learning activities that are not prevalent in general, there appears to be an association between self-reported task complexity and certain WLAs. With increasing self-reported task complexity, a larger share of respondents regularly engage in activities that require critical thinking, adaptation to new problems and online collaboration. Our survey instrument scoped self-reported task-complexity based on a scale adapted from Morgeson and Humphrey (2006) on variety and difficulty of skills needed to complete a task, the necessity for unique answers, the lack of obvious solutions novelty.

Ultimately, the analysis of the relationship between task categories and learning tasks undertaken is out of the scope of our study and therefore we cannot tell why workers within different task categories reported different levels of engagement in workplace learning. Overall, the factors implicated could be individually-based (that is, due to workers' individual characteristics), environmentally-based, or both. The workplace learning 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 – that is, in their learning-intensity (Skule, 2004). We could hypothesise that some categories of tasks may require more or less frequent upskilling and reskilling to maintain one's employability and competitiveness.

Lastly, Figure 11 gives an overview over worker sub-groups and their average use of selected learning activities.

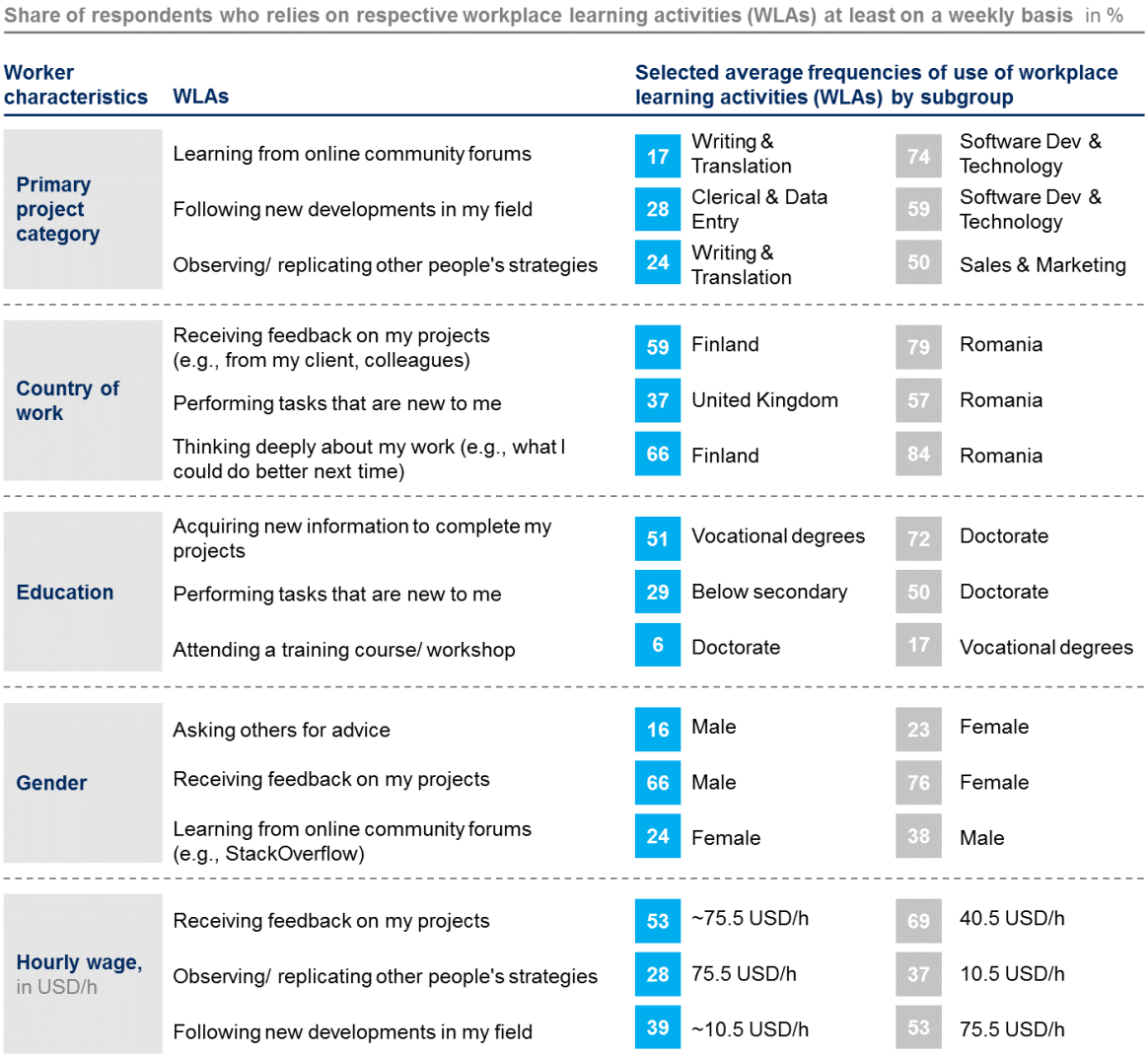


Figure 11: Average frequencies of use of selected workplace learning activities by subgroup.

In general, the differences in learning activities between countries of work are not considerable. That said, crowdworkers working from Romania, of which more than 90% have also been born there, on average report higher frequencies of usage of WLAs and SRL

strategies. This phenomenon could be partially driven by the relatively high share of respondents with a tertiary education background in this subgroup. However further research is required to identify and analyse other potential explanations, which are outwith the scope of this study and this report.

2.2.2. Self-regulated learning strategies

Self-regulated learning (SRL) strategies are generally defined as 'self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals' (Zimmerman and Kitsantas, 2005). Zimmerman's model of self-regulated learning postulates that individuals self-regulate their learning in three phases: strategic goal planning, implementation / volitional control, and self-evaluation (Zimmerman and Kitsantas, 2005). Zimmerman and Kitsantas operationalise these phases into a set of further self-regulated learning sub-phases such as goal setting, task analysis, self-control, self-efficacy beliefs, self-observation, among a number of others. Our survey instrument included a scale to scope and measure the frequency of use of SRL strategies based on Fontana et al. (2015) adapted to the crowdwork context. As described in section 2.1.2, the ability of workers to self-regulate their learning is a good indicator for higher levels of skill development on the platform and more frequently conducted learning activities. In the following section, we have structured our results around Zimmerman's original three phases.

Overall, freelancers reported using a wide range of sophisticated SRL strategies to strategically plan, implement and reflect on their learning (Figure 12). That said, crowdworkers' typical learning strategies are relatively slightly tilted towards implementation rather than strategic goal planning or self-evaluation.

In terms of strategic goal planning, most respondents seem to set their own performance standards (83 percent state that this practice is always true or true most of the time), while only roughly a third appear to be regularly setting short- and long-term learning goals, reviewing these, and making learning plans. Similarly, more than half of our respondents confirmed that it is true most of the time that their typical behaviour consists of, prior to starting a new task or a project, first understanding what they needed to learn in order to complete the project. Many crowdworkers also report that they at least occasionally come up with several learning strategies to pick and choose the most suitable one for their goals or make a plan on how to achieve them.

When it comes to implementation, 95 percent of freelancers agree that it is always true or true most of the time that they try to thoroughly understand the problem once they are faced with a challenge. On average, a majority of workers thought it to be true most of the time that they apply lessons learned from previous work (83 percent) and collect information from many different sources to support them in their learning (77 percent). Overall, they reported high self-efficacy, demonstrated by reported confidence that they will be able to meet all the demands of platform work (88 percent) and able to use what they learned on the platform for future jobs (76 percent). These implementation strategies to self-regulate learning paint a picture of crowdwork that is supported by our qualitative findings. Freelancers pragmatically rely on on-

the-job learning and previous work experiences as needed to complete their current projects at hand. Again, this picture is supported by those self-regulated learning strategies that are considered true most of the time by more than half of participants, including considering new information as a starting point for subsequent ideas (67 percent), using strategies that have worked in the past (66 percent), adapting existing learning strategies to each project (61 percent), changing them once they do not yield any results (59 percent) and constantly reflecting on how newly learned material is related to their existing knowledge, a strategy that in the learning sciences literature is known as 'activation' and that promotes learning (61 percent). Additionally, the majority of crowdworkers appear to meet their learning goals and are intrinsically motivated to learn and develop their skills. For example, 60 percent reported that it is important to them to learn new things in their platform work. However, on a regular basis, only a smaller subset of workers seems to integrate more formal strategies of learning implementation into their typical behaviour such as making notes or diagrams (41 percent), regularly reviewing progress towards learning goals (32 percent), or blocking time in their calendar to learn (20 percent). The latter finding aligns particularly well with our observation in section 2.1.1 that a smaller share of workers reported to have actively spent time developing a skill in the past month than those who agreed to have developed their skills on a frequent basis through their project work.

When it comes to reflecting on their learning, a majority of crowdworkers make time to relate their new skills or insights to the bigger picture in terms of their professional development or other projects. About 58% percent of crowdworkers in our survey sample appear to be engaged in reflecting upon and reviewing their learning progress. However, this reflection remains informal and private for the average worker, who will tend not to codify learnings in the form of private or public notes or consider how others might benefit from new insights on a regular basis.

Yet, we also found evidence of some of the self-regulated learning strategies having a considerable social dimension. For example, 79 percent of workers reported sometimes reaching out to others for help when having difficulty learning. 72 percent of respondents stated to have shared their learning with others at least sometimes.

In sum, freelancers' learning strategies appear to consist mainly of on-the-job learning without relying on many structured processes such as formal goal-setting or learning plans that would be commonplace within an organization. That said, workers do appear to reflect on their learnings on a regular basis, albeit only formalizing or publishing these thoughts on occasion.

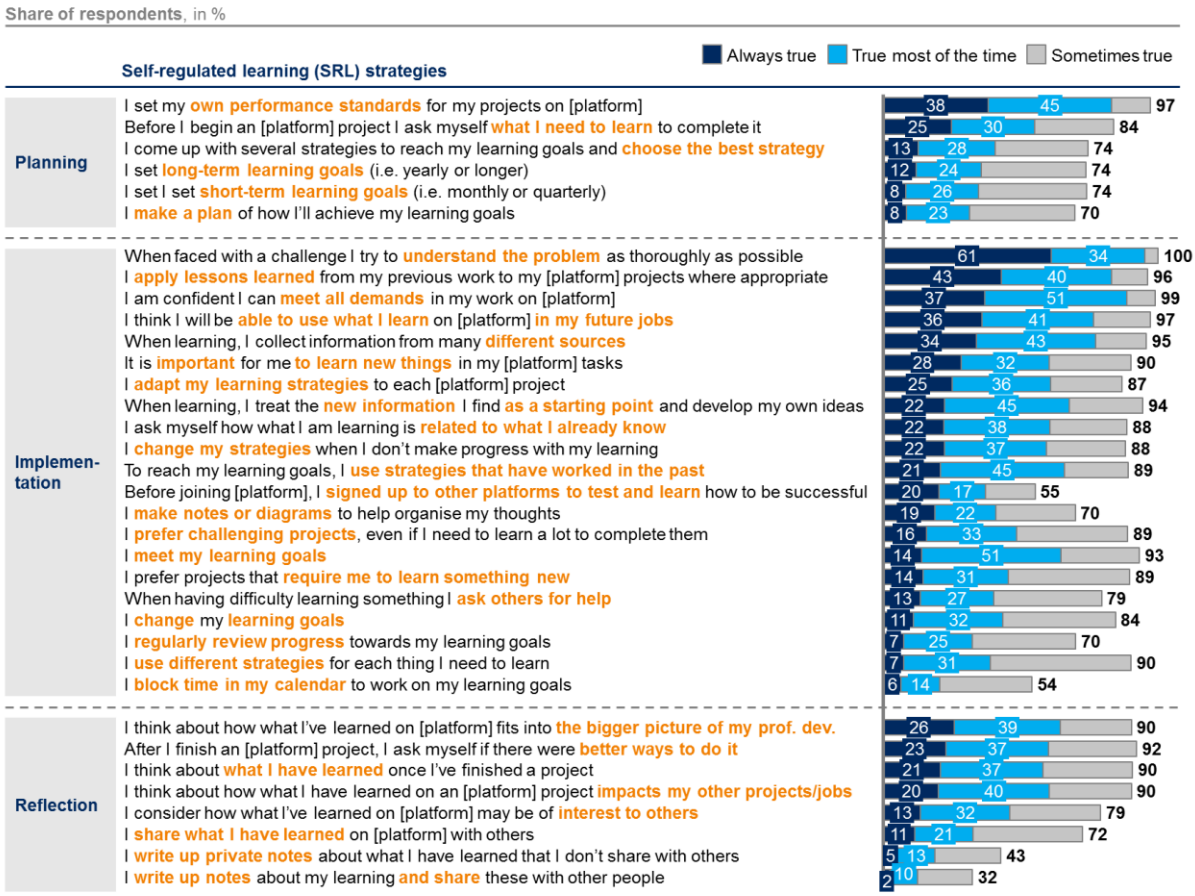


Figure 12: Summary of variables capturing self-regulated learning (SRL) strategies

These findings are also largely in line with extant research on crowdworkers' learning (Margaryan, 2019a; 2019b) further corroborating the previous findings that despite the absence of conventional organisational scaffolds for learning and development, crowdworkers are highly learning oriented and engaged in a wide range of strategic SRL behaviours in their platform workplaces. Emerging economic research also confirms that crowdworkers can be "highly forward-looking, abandoning skills with no perceived future and picking up new skills, primarily through learning-by-doing" (Horton & Tambe, 2019).

Furthermore, these findings corroborate previous research in workplace learning demonstrating that deep and powerful learning occur in everyday working life (Billett, Harteis and Etelapelto, 2008; Illeris, 2011; Malloch, Cairns, Evans and O'Connor, 2011) and suggest that platform workplaces are not an exception. A considerable amount of evidence has been collected over decades of research in workplace learning demonstrating that, rather than drawing on formal learning and training, adult professionals develop skills predominantly through on-the-job learning mechanisms including deliberate practice (Ericsson et al., 2006); reflection on and in action (Schon and DeSanctis, 2011); self-regulation (Zimmerman, 2006); mimesis (Billett, 2014); recontextualization (Guile, 2011) and knowledge sharing and collaborative problem solving (Boisot et al., 2011). As our study shows, skill formation in

platform workplaces is also underpinned by many of these on-the-job learning mechanisms, therefore rather than focusing on providing formal training, the focus of policy should be on creating and fostering the environmental conditions to enable people to develop the mindsets, capabilities and skills to strategically self-regulate and self-direct their learning and to proactively set up mutually-beneficial cooperative relationships with other people to learn with and from.

3. Findings on how platform markets promote skill development

In this section, we examine how and to what extent platform markets promote the effective development of crowdworkers' skills (RQ4a). In the previous section, we approached the issue of skill development from the workers' perspective, examining what learning strategies the workers employ. In this section, we approach the issue from the perspective of platform companies and other organizations and institutions involved in platform markets, asking what kinds of support they may be offering to crowdworkers to promote their learning activities. The findings are based on interviews with multiple stakeholders: representatives of platform companies, platform clients, labour unions, independent worker associations, learning providers, and policy makers. We also reviewed relevant websites and press releases, and drew on evidence from our interviews and survey with crowdworkers to triangulate the findings and add detail from the workers' perspective.

Overall, the picture that emerges is that while crowdworkers remain responsible for their own skill development, various stakeholders are providing different types of formal and informal support and resources to help them. The degree to which the workers find this support useful varies, and there are opportunities for improvement.

3.1.1. Platform companies' role in skill development

Online labour platforms can be seen as being involved in supporting their workers' skill development in a number of indirect ways. The main mechanisms through which this takes place are as follows (detailed case examples of these mechanisms are provided following section 3.1.1):

- Publishing data on which skills are in demand, to help workers develop their profiles towards clients' expectations (Figure 13);
- Getting clients to give feedback to workers, to help workers identify their strengths and weaknesses;
- Referring workers to learning providers that offer relevant courses or resources;
- Providing a venue for workers to engage in peer-to-peer support and learning; and
- In one case, providing a training marketplace, in which skilled freelancers offer training to other freelancers, blurring the distinction between a labour platform and a learning provider.

Platforms vary in the extent to which they provide these mechanisms. The depth of platforms' commitment to skills depends on their business strategy and what they perceive the legal constraints to be. Online freelancing platforms generally do not see a business case for more direct involvement in training their workers. As one platform executive told us: "As a

platform at the moment, it's not our goal to develop freelancers to learn new skills. It's our goal to find freelancers with the right skills."

The market is segmented in such a way that platform companies such as Upwork and Twago place the biggest clients and the most skilled freelancers in separate "enterprise" versions of their platform, whereas other clients and less select freelancers are hosted in the public "marketplace" versions of the platform. According to a Twago executive, the freelancers on the enterprise side are "highly skilled people who already know what to do and have done the job before". Upwork likewise wishes to attract "very highly-skilled professionals" that are "at the top end of certain professions". The platform companies see their biggest growth potential in the enterprise side, but training such workers is expensive and risky, because they may take their skills elsewhere. Thus, rather than investing in directly supporting freelancers' skill development, platforms invest into freelancer satisfaction, community promotion, and marketing initiatives to attract and retain skilled freelancers from the outside.

Finally, platform companies are concerned that too much involvement in skill development and training could risk them being potentially reclassified as employers, which they wish to avoid. This is because in many jurisdictions the provision of training is considered one of the hallmarks of an employer, and could therefore potentially be used in a lawsuit challenging the employment status of platform workers to argue that the workers should be classified as employees. Thus overall the platforms see themselves as having only a limited and indirect role to play in supporting crowdworkers' skill development.

The crowdworkers that we spoke to likewise saw a fairly limited role for platforms in supporting skill development. Some considered that platforms had a role in providing tutorials and guides on platform-specific issues, such as how to design an attractive platform profile, how to navigate the platform's escrow process, or who to contact in case of a dispute with a client. But they did not see platforms as experts on the skills that they were selling, and thus did not view platforms as well-placed to offer learning materials or other expert guidance in these areas. Instead, workers preferred to seek out learning materials from other sources that they did see as experts, such as recognized professionals in their field who provided tutorials on YouTube. This suggests that if platforms did want to get more involved in workers' skills development, they would first need to become better recognized as sources of expert knowledge.

Several crowdworkers expressed concerns that if platforms offered too much guidance in the way of general freelancing skills, that this would flood the market with crowdworkers who knew how to market themselves, but did not necessarily possess strong technical/core skills. There was a general worry – the market already being perceived as highly competitive – that any additional boost to less successful workers would dilute the amount of work available (although the competition situation varies between market segments, with some experts such as mobile app developers remaining in high demand). Therefore, current successful crowdworkers and platforms to some extent agreed, though for different reasons, that crowdworking platforms should maintain a limited role in workers' skills development.

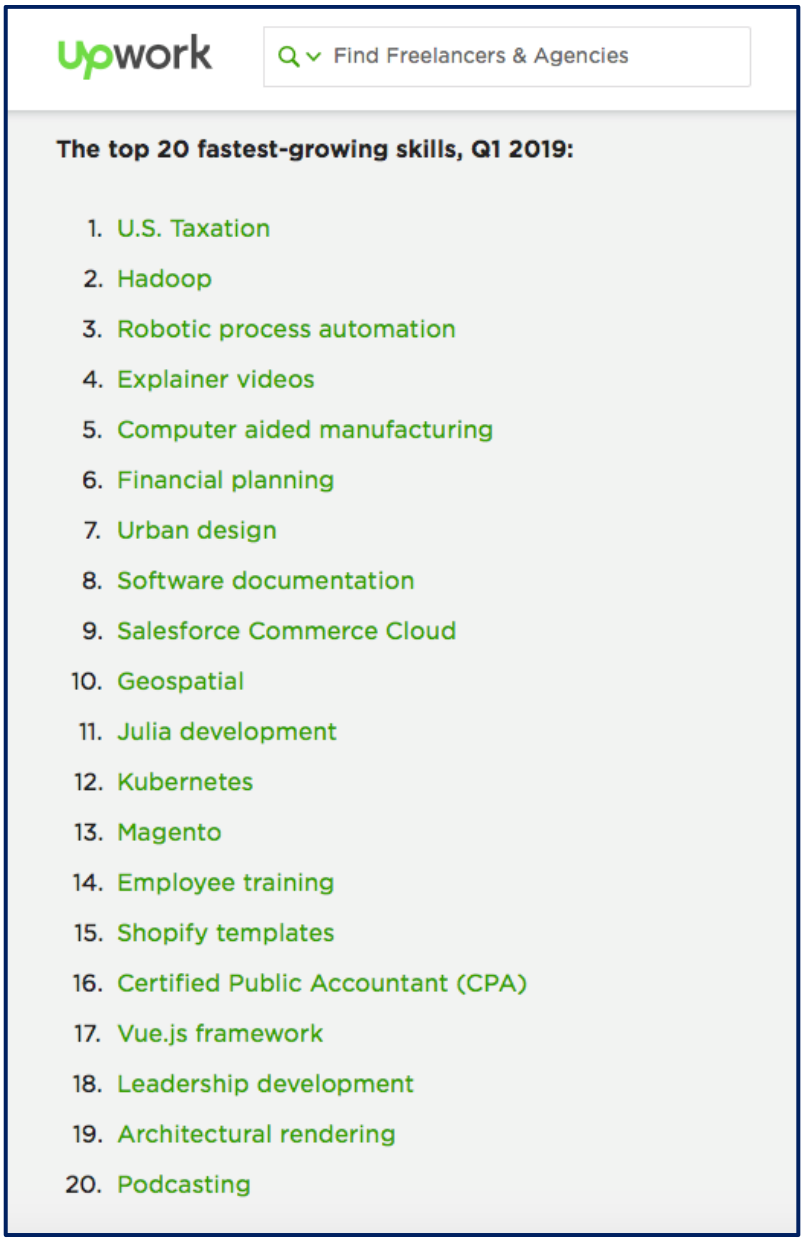


Figure 13: Upwork's list of top 20 fastest-growing skills

3.1.2. Clients' role in skill development

Online labour platform companies have a wide range of clients, from individual people to small- and medium-sized enterprises, to large multinational corporations. Different clients seek different benefits from using online labour markets (Corporaal & Lehdonvirta, 2017). Some clients seek cost savings, as platforms provide access to workers in lower labour cost countries. However, cost savings may not be the main selling point, especially for platforms that cater for highly skilled work. Clients use platforms to access specialized skills that are not available in their local labour markets, and/or that are only needed occasionally. Compared to

conventional staffing agencies, platforms are often able to provide faster fulfilment times and lower overhead costs (Corporaal & Lehdonvirta, 2017), and they are also easier to access for SMEs and individual entrepreneurs who would not typically use the services of a staffing agency. By helping firms overcome local skills gaps, online labour platforms may be helping to boost growth, although quantitative evidence on this is lacking.

A significant point of difference between regular employment and staffing agency work as compared to crowdwork concerns training provision. Especially larger employers often provide training for their workers, and there are often public policies in place to support this. In contrast, in crowdwork it is exceptionally rare for clients to provide any degree of training for the workers. At most they might provide documentation or guidance on any company-specific systems or technologies that the worker is expected to use as part of the engagement.

A representative of a large European company, which was a client of an online labour marketplace, told us that they did not view training freelancers as their responsibility, as it was the freelancer's responsibility to invest in their own training. Moreover, clients often turn to platforms, as opposed to staffing agencies or other established contingent labour providers, when they need very fast turnaround times (Corporaal & Lehdonvirta, 2017). Consequently, they require workers who are able to start the work immediately, without any further time investment into training. Also, in the high-end enterprise segment of the market, contracts are costlier for clients, with the consequence that there is little or no tolerance for some important forms of on-the-job learning, such as learning by trial-and-error. It is also worth noting that these enterprise clients often look for freelancers with strong experience in applying their skills in a very specific business context or industry. This emphasises the importance of upskilling via on-the-job learning over de-contextualised training courses.

Nevertheless, we also observed some grey areas in the relationships between freelancers, clients, and skill development. Crowdworkers told us that they were sometimes explicitly encouraged by their clients to learn on the job, using self-discovered resources and unpaid personal time. More frequently, workers engaged in on-the-job learning during billable hours, without the client's knowledge.

Besides financially supporting crowdworkers' self-directed learning activities, probably the most effective way in which clients indirectly supported crowdworkers' skill development was by giving feedback on performance. 92% of respondents in our survey stated to receive feedback on their projects by clients or fellow crowdworkers. However, the amount, accuracy, and timeliness of the feedback that clients give varies widely between clients and engagements. Platforms are typically designed to try to elicit feedback from clients, which is helpful. But platforms typically focus on evaluative feedback intended to help prospective future clients, instead of developmental feedback designed to help the worker develop their skills. Clients could contribute more to crowdworkers' skill development if there were more incentives, structure, or culture in place for clients to give constructive developmental feedback to their workers.

3.1.3. Trade union and self-employed workers' associations' role in skill development

Trade unions have a tradition of supporting the training and skill development activities of workers, which sometimes includes self-employed freelance workers. For instance, the National Union of Journalists in the UK provides certified training courses and workshops, and curates resources for trainees who are looking for trusted pathways to a career in freelancing. More recently, self-employed freelance workers' associations, such as the US-based Freelancers Union, have also started to provide different forms of support for their members.

However, union membership among online freelancers is very rare (Wood & Lehdonvirta, 2019). Only 8% of the respondents to our survey were a member of a union or association, and of those who were, in only less than half the cases the membership was related to their online freelancing activities. Similarly, none of the freelancers interviewed for this project were members of freelancer-specific unions. Only four interviewees were or had been members of unions affiliated with their prior, conventional employment (e.g. an NHS employee with UNISON National membership), but none had received any support or educational materials related to freelancing. None of the union or association representatives we interviewed said that their organisations offered direct skills training specifically for online freelancers. However, some crowdworkers had received union training in their past regular employment, and were now benefitting from the skills in their platform work.

All the union representatives we spoke to recognised that engaging and supporting freelancers in their skills development was an opportunity to make unions more relevant in the modern economy, increase union membership, and therefore improve the working conditions of more vulnerable freelancers. The Freelancers Union emphasised the necessity of unions to adopt a holistic approach to freelancing, so that training covers running a small business, administration skills, managing health care and pension provision, entrepreneurial skills such as self-promotion and reputation management, as well as technical/core skills. Self-advocacy especially during dispute resolution could be an additional skill for freelancers to learn. A representative of IPSE – the Association of Independent Professionals and the Self-Employed – told us that at the moment "freelancers don't really know where to go" to acquire these skills, other than acquiring them through first-hand experience.

3.1.4. The role of policy makers and government in skill development

In regular labour markets, governments support skills development by funding training institutions, administering training schemes, and offering vouchers and tax incentives to companies that train workers. In contrast, none of the policy experts interviewed for this study could cite any specific policies for crowdworkers' skills development, and policy support for self-employed people's skill development more generally is scarce.

Some of the workers whom we interviewed expressed interest in a public platform or database that would make it easier for them to discover both online and offline courses that could support their skills acquisition and development. In particular, crowdworkers told us that they wanted access to free, jurisdiction-specific training on issues related to the administrative aspects of working as a freelancer, such as taxes, business registration, and managing their finances. Technical/core skills training is available from various learning providers, but there is

no obvious destination for freelancers to learn the administrative side in most jurisdictions. This is one area where government could play a role, directly or indirectly.

3.1.5. Learning providers' role in skill development

Learning providers such as further education colleges have a well-established role in traditional labour markets, where they provide skills training to, for example, car mechanics and construction workers. More recently, the adoption of broadband Internet has allowed various kinds of online learning providers to enter the market. For instance, in the UK, online learning provider Learn Direct was set up in 2000. Today, it sells a range of courses, including a Certificate in Practical Entrepreneurship. At one point Learn Direct operated with support from the UK government and the European Union. But after state support was withdrawn, Learn Direct was taken over by a private equity fund and it is currently struggling to remain viable. More recent commercial online learning ventures and Massive Open Online Courses (MOOCs) include Coursera, Khan Academy, Udemy, and Skills Share. There is an emerging market for online learning providers that specifically target freelancers. For instance, Simplilearn offers "digital economy training", such as the Certified Information Systems Security Professional (CISSP) certification, which has become a prerequisite for anyone intending to be a freelancer in information security.

Overall, crowdworkers across our sample tended to feel a certain level of scepticism regarding most digital learning providers, each for their own reasons: governments are viewed as unaware of how crowdwork functions and what's needed; formal education providers are always several years behind the latest trends; and for-profit companies are, first and foremost, looking to make money from learners. This often meant that crowdworkers were concerned that they were either being sold courses that weren't relevant to them or which hadn't had the necessary time and care put into their development:

> *"I use [various online learning providers] but, generally, what I see is that these are all businesses. Sometimes what I learn from there is very, I don't know... They want to entice you to pay for something that maybe you're not even going to need."*

This general scepticism translates into utilization of paid learning services. Figure 14 showcases that only up to a third of our respondents indicated to have used paid training opportunities such as in-person workshops (36%) or paid online courses (27%) at least occasionally over the past three months.

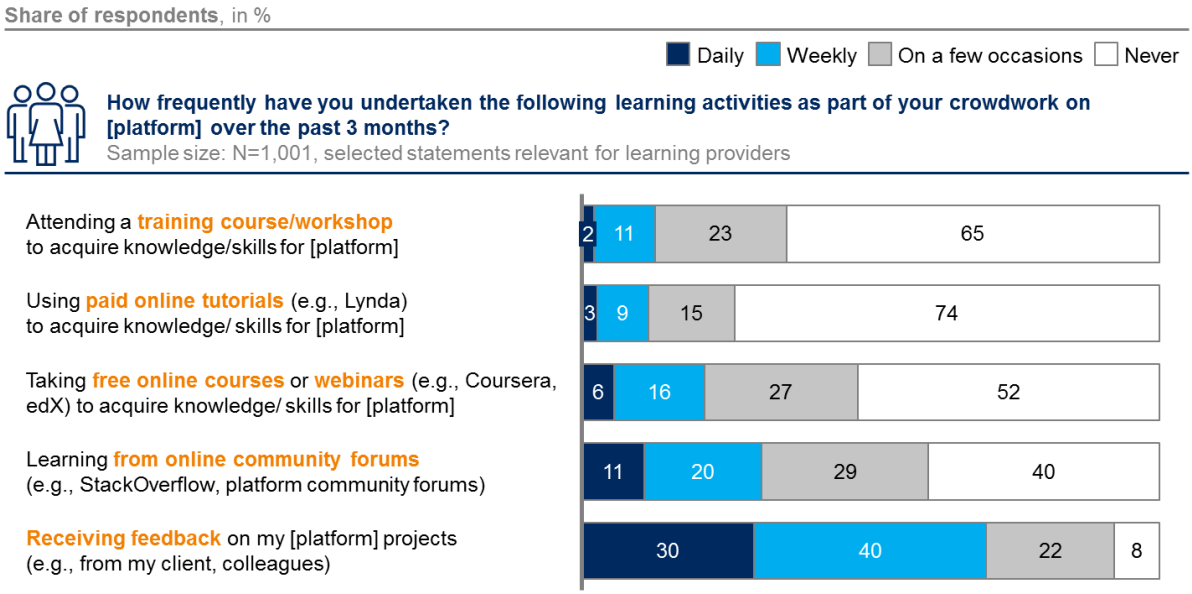


Figure 14: The majority of respondents stated to have never used a paid learning services such as workshops or paid online tutorials in the past 3 months

Half of our respondents did not draw on free online courses. The latter can be explained, as argued elsewhere in this report, by the fact that crowdworkers value their time in addition to their financial resources. More common are just-in-time learning activities such as looking up queries online, for instance in online community fora, or feedback specifically aimed at crowdworkers' output on the platforms in question.

Besides improving their offerings to be more in line with crowdworkers' needs (and those of self-employed people more generally), learning providers will probably need to work more on gaining the workers' trust. Also efforts should be made o separate high-quality providers from lower-quality ones.

3.1.6. Co-working spaces

As Internet-mediated gig work and other forms of independent work have grown in popularity, so have co-working spaces. Co-working spaces typically take the form of a centrally located office space shared by employees of different companies and/or contractors. For a fee, these workers can afford shared infrastructure that they otherwise would not have access to as independent workers. In principle, co-working spaces could offer opportunities for peer learning that in regular employment happens in the workplace.

Of the crowdworkers we interviewed, only one interviewee (based in Germany) utilized a co-working space with other online freelancers, while one other Spain-based crowdworker expressed interest in starting her own co-working space due to the lack of such an organisation in her village. However, several other crowdworkers identified the ability to work physically alone, asynchronously with co-workers, and on their own schedule as reasons why they

preferred crowdwork to more traditional, offline and workplace-based forms of work. It is thus not clear if crowdworkers' still quite infrequent use of co-working facilities is due to lack of access or simply lack of interest.

3.1. Case examples of platform support in skill formation

In this section we provide detailed case examples of some of the indirect mechanisms through which online labour platform companies support workers' skill development activities.

3.1.1. Providing information on in-demand skills

Savvy freelancers monitor the market for skills that are in demand, and adjust their profile or update their skills in response. To assist in this, some platforms publish information on their most sought-after skills. Upwork, for example, publishes a quarterly list of skills whose demand has grown most over the past quarter (Figure 13). However, it is not clear how valuable such lists are to freelancers. While some crowdworkers mentioned the platform-provided skills list, they were more likely to mention manually searching their platform of choice to see which freelancers were most successful (in terms of feedback ratings, jobs completed, money earned, etc.), which skills they had, and how they marketed those skills on their profiles. Crowdworkers then emulated these successful practices, updating their profiles to highlight currently profitable skills. These were skills that they already had, were in the process of obtaining, or believed that they could get away with developing on the job.

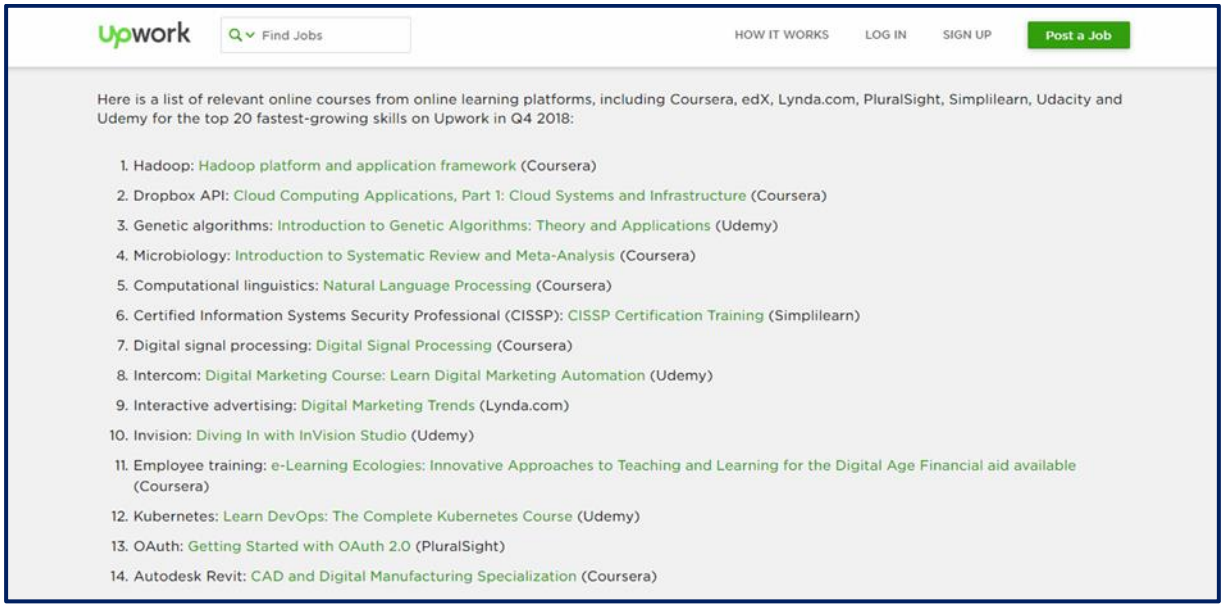


Figure 15: Upwork's list of recommended courses

3.1.2. Recommending training courses

Besides listing in-demand skills, Upwork also lists relevant training courses from online learning platforms that freelancers could potentially use to develop these skills (Figure 15). Other platforms are doing similar things. In some cases, these recommendations amount to commercial partnerships between online labour platforms and learning providers: contractual relationships where the platforms earn commissions in return for referring workers to the learning providers. For instance, since 2016, PeoplePerHour has been in a commercial partnership with the online learning provider Skillshare. PeoplePerHour curates lists of courses on Skillshare that it recommends to its freelancers.[4] These lists are categorised by skill, such as search engine optimisation, or sector, such as marketing. If a freelancer takes a course recommended by PeoplePerHour, Skillshare offers a 30 percent discount to the freelancer.[5] On its website, PeoplePerHour tells its freelancers that Skillshare is "an online learning community" that "works just like Netflix" to provide "bite-sized short video sessions to fit your schedule". Freelancers get a certificate for passing these courses, which they can then display on their PeoplePerHour profile.

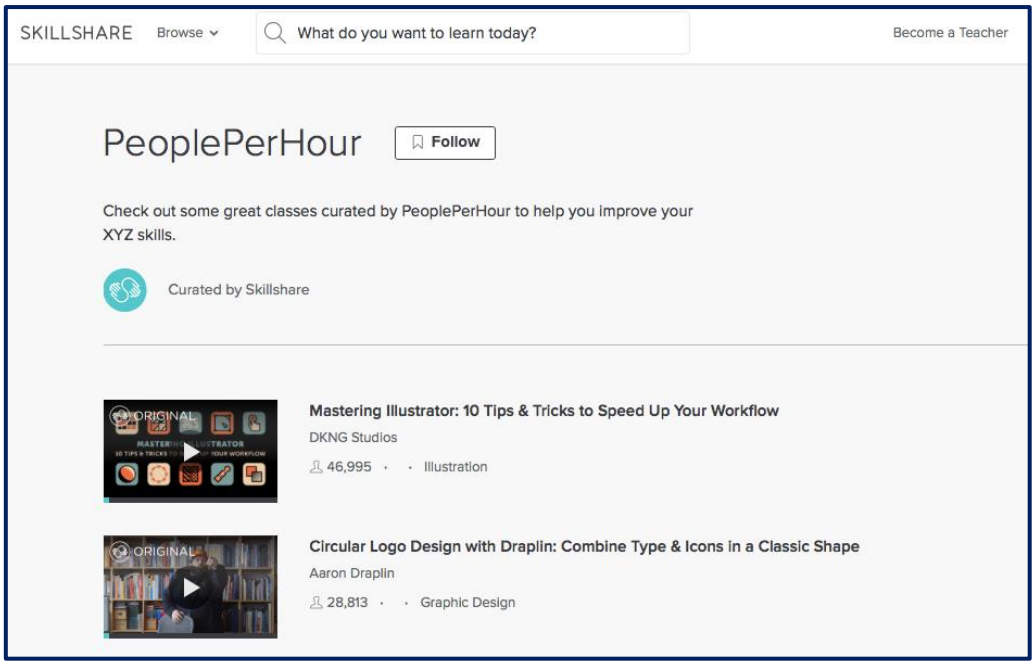


Figure 16: PeoplePerHour's partnership with Skillshare

3.1.3. Facilitating peer-to-peer learning

Most online labour platforms provide formal and informal opportunities for communication between freelancers and between freelancers and clients. For example, Upwork provides a "community forum" (Figure 17). The main exception to this is Amazon Mechanical Turk, a

[4] See: https://www.skillshare.com/lists/PeoplePerHour/69

[5] See: https://blog.peopleperhour.com/blogroll/partnership-skillshare-get-3-month-free-membership/

microtask platform that does not provide a means for workers to see or communicate with each other.

Interviewees from the stakeholder organizations cited these fora as opportunities for freelancers to exchange skills and training assistance. Worker interviewees offered a somewhat more measured assessment. Some platform fora were perceived as well-designed, and they were sometimes used to look for answers to frequently asked questions. However, most interviewees preferred to use fora and online communities not affiliated with online labour platforms, or to not communicate with other freelancers at all. Other workers were often perceived as competitors, leading to the perception that “most of the times they won’t help you to learn new skills”.

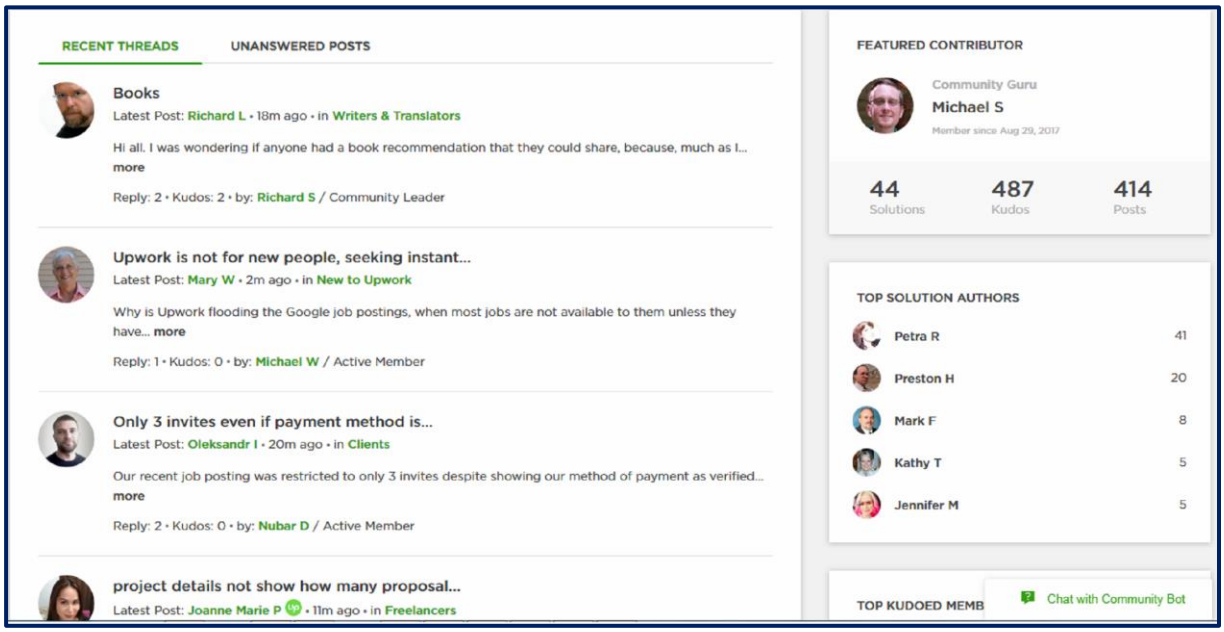


Figure 17: Discussions on Upwork's community forum

Online communities not affiliated with platform companies in which crowdworkers found peer support included Facebook Groups, Reddit subreddits, Slack workspaces, and online fora dedicated to freelancers, “digital nomads”, and specific skill sets such as particular software development technologies (for an example, see Figure 18).

Platform companies also made some efforts to support local, on-site networking and peer learning between freelancers. For instance, Fiverr offers its freelancers a community fund. Freelancers who are willing to organise events can obtain funding to pay for room hire, refreshments and resources so that Fiverr freelancers can meet, socialise, and exchange experiences and skills during workshops. Fiverr calls these workshops “Levelling Up” events, and they are run by “Training Leads”.[6] Similarly, Upwork facilitates ‘huddles’, defined as “independently organized meetups, hosted by experienced Top Rated freelancers for the local

[6] https://events.fiverr.com/communityleadership

Upwork freelancer community".[7] Although huddles are primarily social events, they are opportunities to exchange learning.

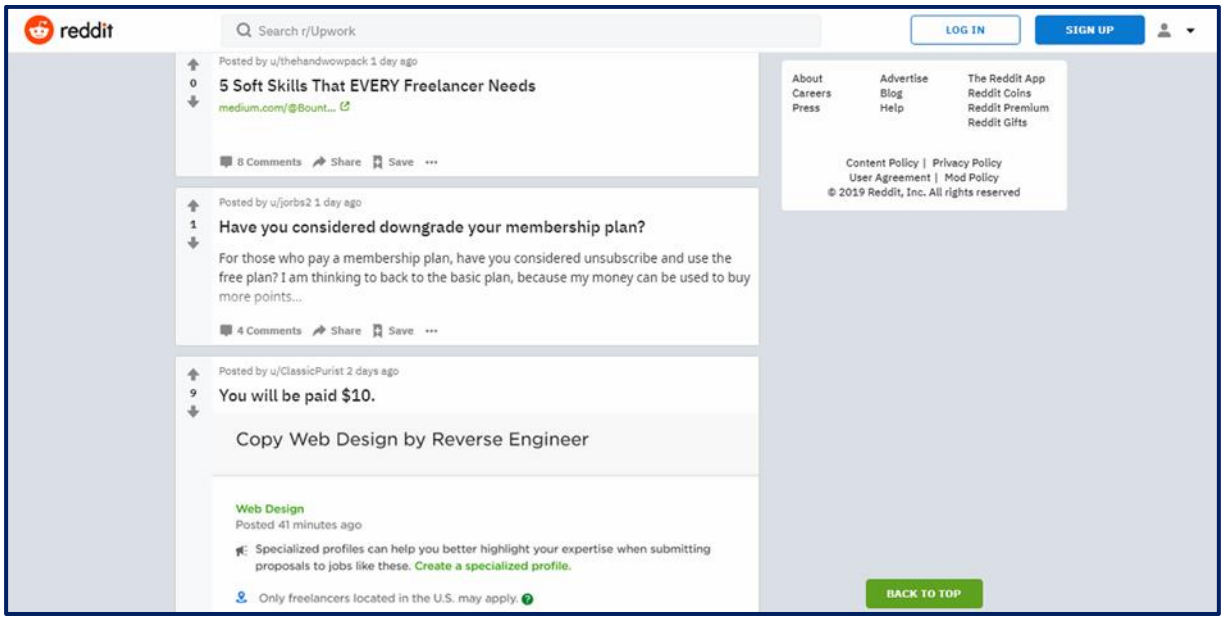


Figure 18: Advice on Reddit for freelancers

3.1.4. Providing a training marketplace

Fiverr's new 'Learn from Fiverr' initiative effectively introduces Fiverr as a new player in the online learning provider market (Figure 19).[8] Launched in the summer of 2018, it is a platform where freelancers can teach skills to other freelancers, who are then expected to sell those skills on the Fiverr platform. Fiverr representatives told us that they surveyed their freelancers about the freelancers' skills needs, and found that freelancers were dissatisfied with current provisions on other learning platforms, including free resources on YouTube. Learn from Fiverr was created as a response to this need.

Learn with Fiverr uses Fiverr's marketplace interface to connect freelancers looking to develop a new skill with other freelancers on Fiverr who are able to provide training in that skill. Freelancers search for a skill, and Fiverr produces a list of other freelancers who are able to offer training in this skill, including their rates. For skilled freelancers, this can be a way to scale up their earnings from the skills that they possess.

Fiverr's business case for Learn from Fiverr includes outsourcing skills tuition to freelancers on its platform and taking a commission for any subsequent transactions. An executive from Fiverr told us he believed the Learn from Fiverr was a cheaper alternative than other skills providers and that freelancers who trust the Fiverr brand would be more likely to

[7] https://community.upwork.com/t5/Upwork-Events/bd-p/Upwork_Events

[8] See: https://learn.fiverr.com

look for training from other Fiverr freelancers. And, because it facilitates transaction between two freelancers, Learn from Fiverr doesn't compromise the freelancer's legal status as self-employed or Fiverr's status as employer. As an incentive, new freelancers taking a course on Learn from Fiverr get a ranking boost on its market.

As of July 2019, Fiverr reports around 20,000 courses taken on its platform. Three of the crowdworkers interviewed for this study mentioned using Learn from Fiverr as part of their approach to skills development. Their comments suggested that Learn had the potential to be a useful resource, and that the model of recruiting experienced, highly-rated freelancers as teachers was a good idea. However, the comments also suggested that Learn from Fiverr was still in the early stages of ironing out issues of course quality ("I was expecting more, to be honest"), specificity ("very basic"), and relevance ("I wasn't very satisfied with it and I think then I lost interest in Learn on Fiverr.") Since the system was new, there was as of yet little accumulated customer feedback to distinguish high-quality courses from less developed ones.

As always, crowdworkers are very focused on return on their investment, both of time and money. This means that courses need to worth the cost of their time and – if there is a fee – worth enough to recoup the fee and more. However, this also means that crowdworkers are not opposed to paying money for a course if they believe it to provide enough value. At this stage, the crowdworkers we spoke to saw other options as better value, including some established online learning providers.

Despite these criticisms, Fiverr's freelancers did see the potential for Learn to improve their skill development and their profitability as freelancers. All three of the Learn users shared their disappointment that they didn't receive an award or other badge on their profile after completing their course, which they hoped would prove that they were particularly skilled in this skill. They noted that external companies (e.g. MOOCs) also don't offer anything like this that was compatible with the crowdwork platforms that they used; however, since Learn was part of Fiverr, they saw it as obvious that skill certification from Learn should be integrated into their platform profiles. This was seen as a particularly useful potential future feature.

While MOOCs also were seen as failing to provide very specialised courses in skills that crowdworkers found relevant to their work, in general they provide courses in a wider variety of skills than Learn. However, the Learn users we spoke to were clear that several larger MOOCs have existed for several years and therefore had time to develop more content and hire more staff. If Learn capitalises on the expertise of the crowdwork instructors, they may be able to offer the more specialised skill training opportunities that MOOCs will likely never have the incentive to provide.

Both users of Learn and the other crowdworkers we spoke to were concerned in general that online learning (as well as crowdwork) was not a familiar concept in their country and so they were underutilised:

> *"I think there are plenty of courses online, but people don't know that. At least here in Italy, we Italians don't have the culture to learn online."*

This is a potential area of growth, both for informal online learning providers such as Learn from Fiverr and for individuals (both experienced crowdworkers and those new to this type of work) to acquire and develop new, economically-viable skills.

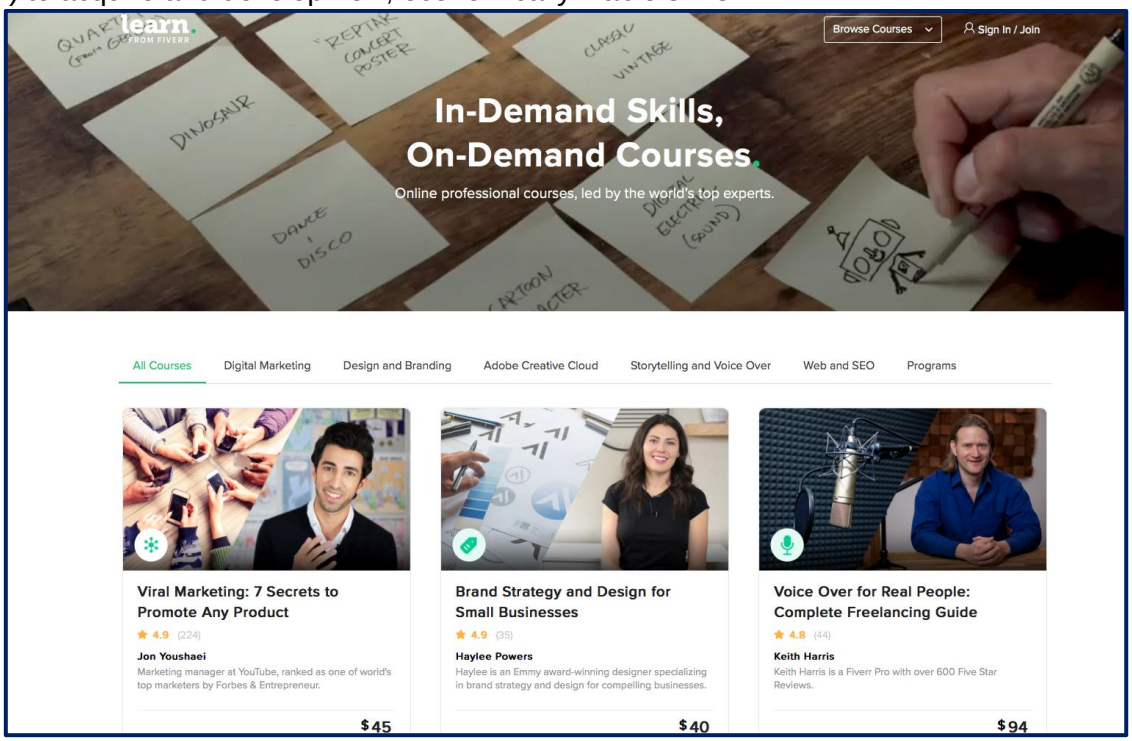


Figure 19: Learn from Fiverr

4. Findings on how platform markets match skills supply to demand

Once crowdworkers have acquired skills, they have to find clients who will pay them to put those skills to use. Conversely, clients must find crowdworkers with skills that meet their needs. In conventional labour markets, there are institutional supports such as publicly regulated systems of qualifications that are intended to reduce these search costs and help match skills supply with demand. In online labour markets, a variety of different mechanisms are used. In this section, we describe how and to what extent platform markets promote effective utilization of crowdworkers' skills, examining in particular the formal and informal certification practices and other types of support for skills matching (RQ4b). The findings are based on our review of platform websites and press releases, as well as interviews with representatives of multiple stakeholders: platform companies, platform clients, labour unions, independent worker associations, learning providers, and policy makers. We also draw on evidence from our interviews and survey with crowdworkers to triangulate the findings and add detail from the workers' perspective.

Different platforms have somewhat different methods of matching clients looking for skills and freelancers who are able to provide them. The basic element common to all freelancing platforms is a worker profile to which information concerning the worker is attached, and which is searchable by clients. In particular, the profile displays feedback information from the workers' previous interactions with clients. Some platforms also allow freelancers to upload and display skills certificates in their profiles. Together these advertise the worker's skills and competencies to prospective clients. Platforms also control the supply of skills on the platform, for instance by vetting new freelancers for basic skills in maths and English.

4.1. Mechanisms for matching skills supply to demand

4.1.1. Skills matching advice

The platforms publish advice for freelancers on how to maximise their chances of attracting clients and winning bids for projects. Twago's Ultimate Guide to Being a Freelancer, for example, offers advice to freelancers to acquire and utilize their skills on its platform (Figure 20). Each platform provides an interface and search capabilities to enable freelancers to access its database, look up and tag skills, and add these skills to their profile. The platforms help by putting these skills into categories or domains and by offering advice to freelancers to tag their own skills, use tags to find work, and generally maximise their skills matching through search.

Figure 20: Twago's "Ultimate Guide" to being a successful freelancer

4.1.2. Tagging, labelling and categorising skills

The platforms we examined enable freelancers to tag, label and categorise their skills. These are mechanisms for freelancers to self-describe their skills in accordance with skills the platforms have identified as existing on their platforms through an analysis of profiles and the skills requirements that clients post (Figure 21 and Figure 22).

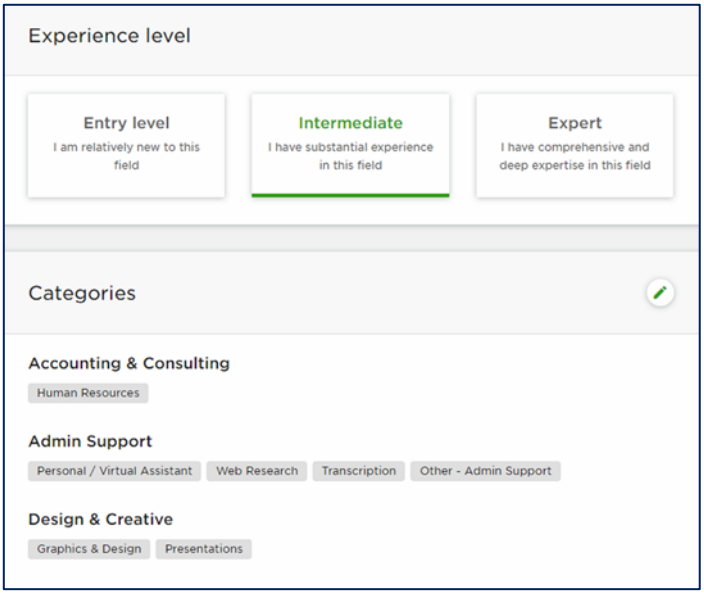


Figure 21: Upwork's facilities for self-describing skills

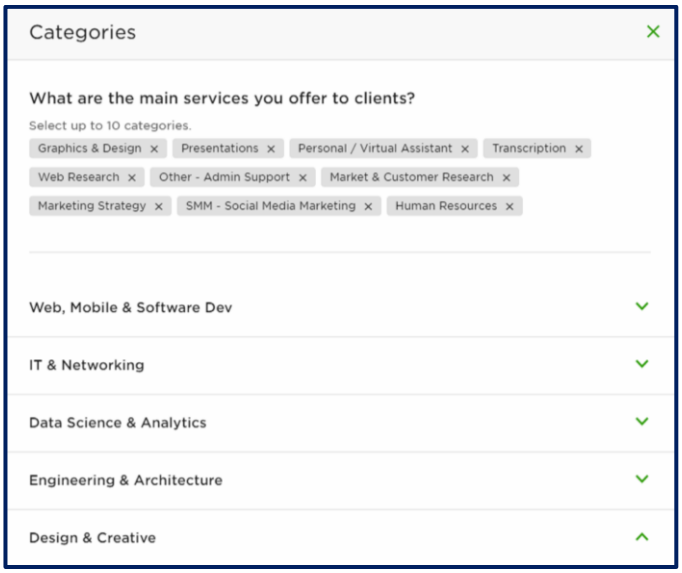


Figure 22: Upwork's facilities for self-describing skills (2)

4.1.3. Skill micro-certification based on automated online assessment

Figure 23. Completion of the PeoplePerHour "Readiness Test"

Several online labour platforms offer freelancers the opportunity to gain digital micro-certificates by passing the platforms' own skill certification tests. For instance, Upwork used to offer over 300 different skill tests on topics ranging from communication in English to graphic design techniques and programming language expertise. Once a test is successfully passed, a digital badge certifying completion is displayed on worker's profile.

However, the efficacy of such tests in helping to match skills supply with demand seems to be limited. Upwork's representatives told us that the company's internal research found that its clients prefer to use profile introductions, portfolios, and job feedback to assess a freelancer's skills and experience rather than skills certificates alone. Indeed, other recent research suggests that skill tests are of limited usefulness in helping new workers enter the

market, because they only certify the worker's skills, but not their general trustworthiness, something that is important in remote work conducted over the Internet by relative strangers (Kässi & Lehdonvirta 2019). Client feedback is seen as more helpful in this regard.

In 2019, Upwork removed most of its skill tests, pointing to the fact that skill test scores could easily be manipulated by cheating, as many skill test answers can be found online. Additionally, Upwork's freelancers told the company that these skill tests – especially technical ones – quickly became out-dated or irrelevant. Upwork nevertheless still offers a 'Readiness Test'. PeoplePerHour has likewise offered its 'Readiness Test' since 2018 (Figure 23). Freelancers on PeoplePerHour who have passed the test display a badge as evidence. The exam tests English and Maths skills by asking questions such as "What is a negative number multiplied by a negative number"; "What is the root cube of 64"? However, videos are published on YouTube showing how to pass these tests, somewhat undermining their validity.

Crowdworkers responding to our survey highlighted the low value of in-platform skills tests, with the majority taking two or fewer tests (Figure 24). Interview respondents explained that some platforms pressured new crowdworkers to take at least one test in order for the profile to be complete, possibly explaining why crowdworkers engaged in an activity which they otherwise saw as unhelpful for gaining new clients.

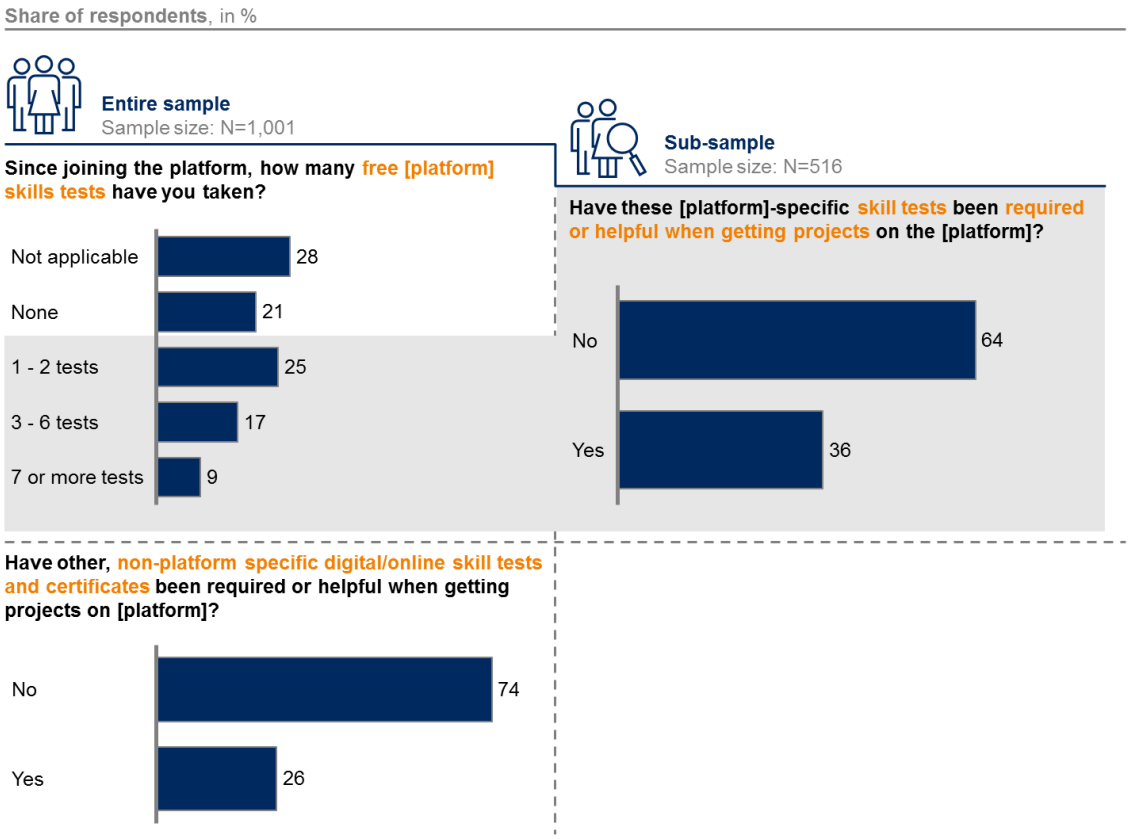


Figure 24: Crowdworkers' attitudes towards and utilization of in-platform skills tests

4.1.4. Automated ranking and endorsement of workers

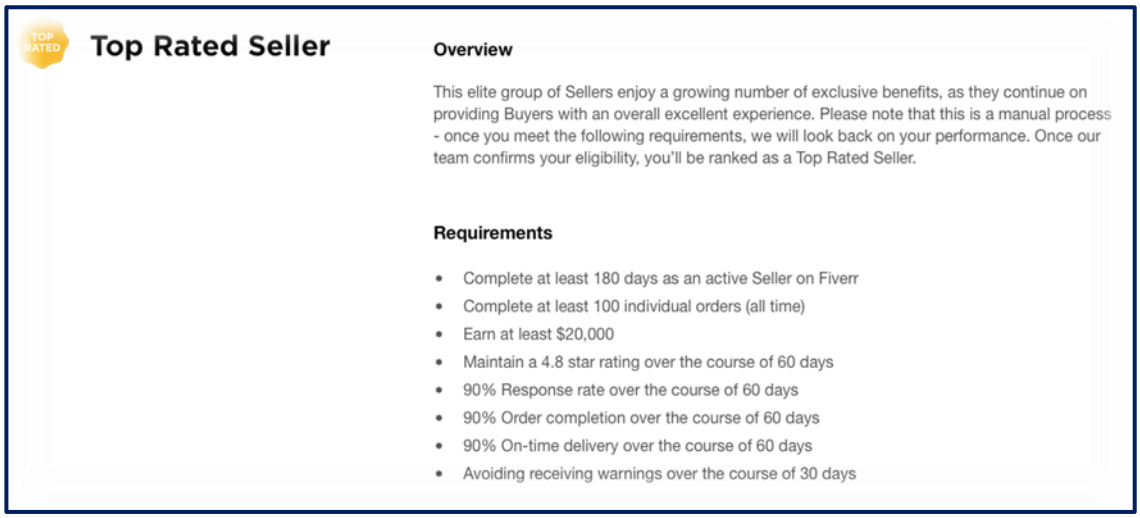


Figure 25: Factors that influence which freelancers are given priority placement in search results on Fiverr

Although skill tests were generally not perceived as very helpful, Fiverr says that its Learn With Fiverr courses – which come with a digital badge that certifies successful completion of the course – are popular with freelancers. It is difficult to ascertain if this is because the certificates obtained via Learn With Fiverr courses are valued by clients, and/or because Fiverr takes success on their courses into account in its system of ranking workers into different levels. Workers' levels influence among other things the order in which they appear in clients' search results, influencing which workers get matched with which clients. Other factors taken into account by the ranking system include measures of reputation and timeliness. While Fiverr publishes lists of factors that influence the ranking (Figure 25), it is unable to disclose specific weightings without making it possible to game the system, and also for business confidentiality reasons.

Other platforms feature similar systems that automatically rank or endorse specific workers based on the data traces that they and their clients leave on the platform (eg. PeoplePerHour's "CERT", Figure 26). The platforms' algorithms draw on this information when selecting which workers to present or highlight to clients. A degree of machine learning can be involved, such that the system learns to recommend workers to clients based on the success of previous matches; however, for the most part the algorithms still appear to be quite rule-based.

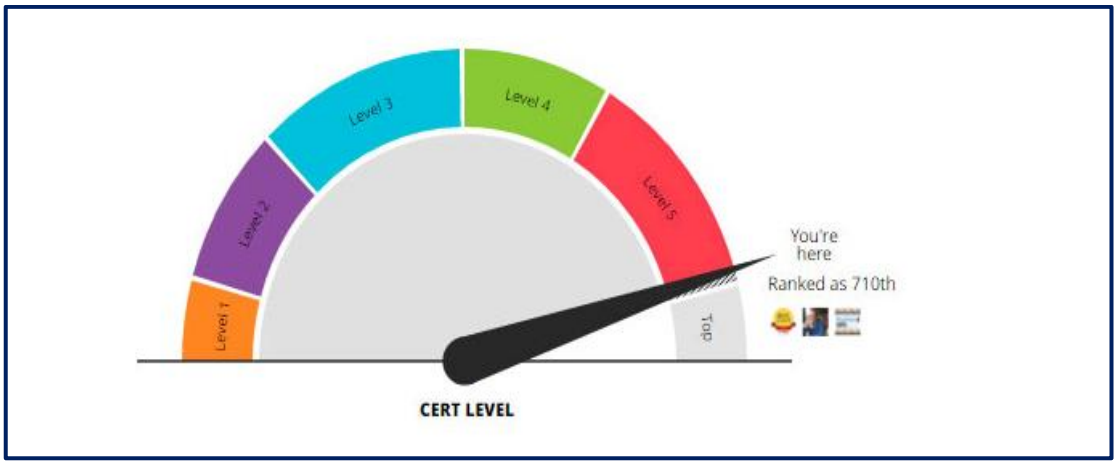


Figure 26: PeoplePerHour user interface displaying a worker's CERT (Community, Engagement, Repeat Usage, Trust) ranking level

4.1.5. Featuring externally obtained skill certificates on workers' profiles

All the platforms in our study enable workers to display their photograph, reputation ratings, client feedback, education, list of skills, and skill certificates on their profiles. Certificates are documents that show a freelancer has completed a course or passed a test. These can be external certificates awarded by training institutions or companies and validated by official bodies such as City and Guilds in the UK, that are intended a signal that these skills are genuine and have been officially assessed.

On Upwork, Fiverr, and PPH's freelancer profile page, certificates are listed at the bottom, which suggests they have less relative value than other signals of professionalism and trustworthiness such as buyer feedback. Twago is distinctive because its profile page allows freelancers to upload PDFs of their certificates to help validate the skills they claim to have (Figure 27); there is no facility to do so on the other platforms we examined. However, unlike Upwork, PPH, and Fiverr, certificates on Twago's freelancer profile page do not have their own section or panel.

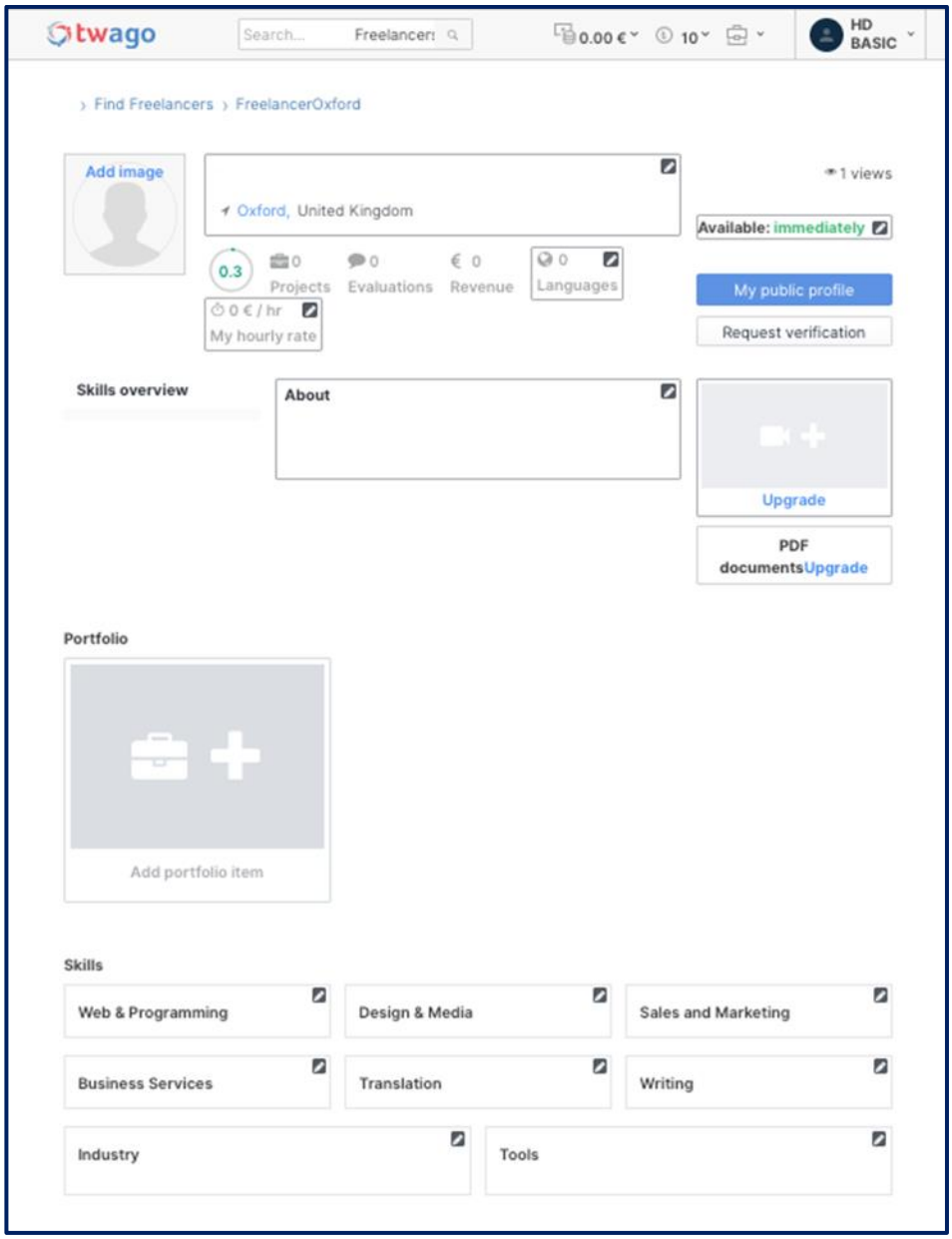


Figure 27: A worker's profile on the Twago platform

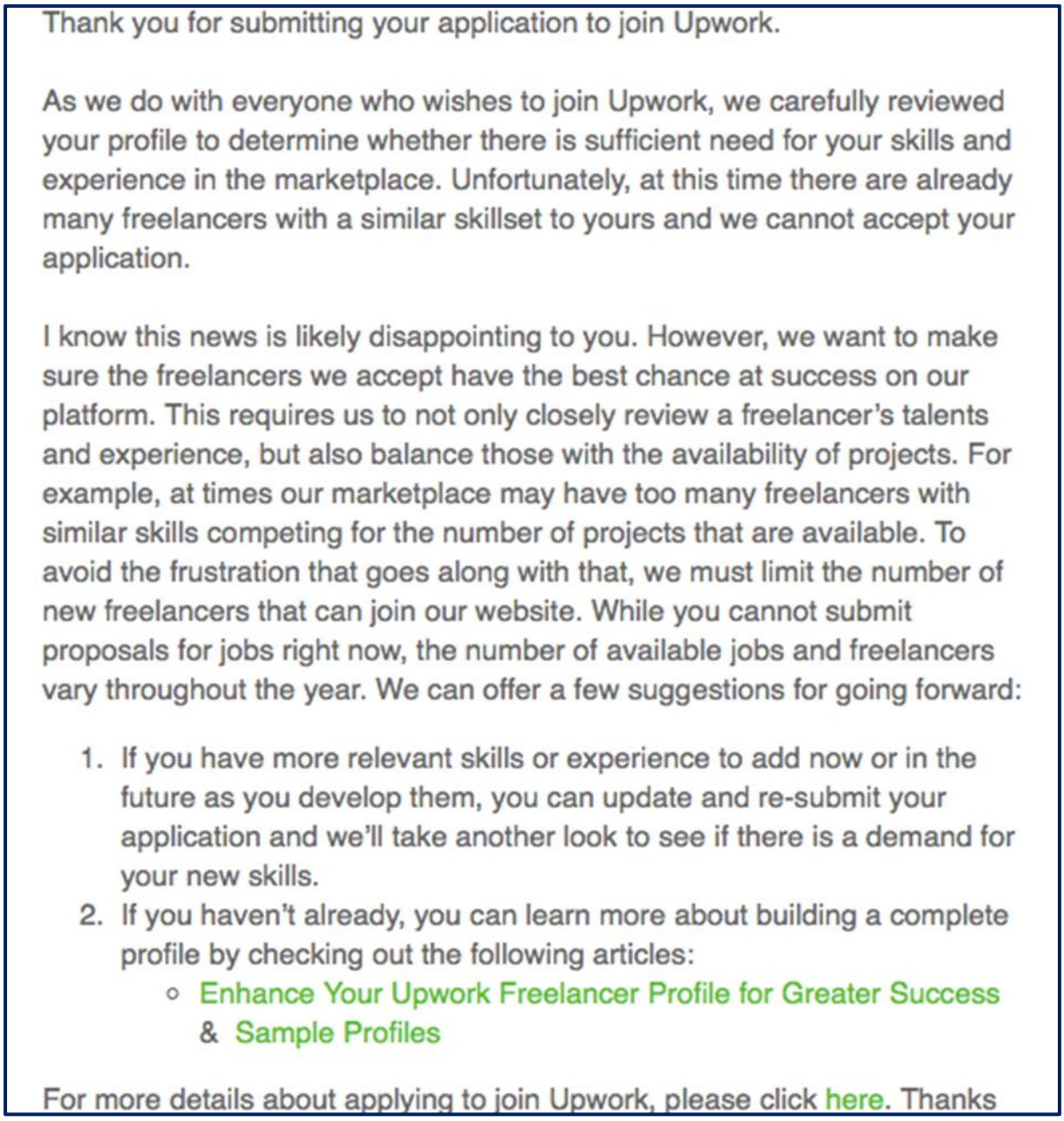
4.2. Managing the entry of new skills into the platform

Platforms are perceived as being open marketplaces that passively host any worker wishing to offer their skills for sale. However, in practice, the platform companies are increasingly proactive in managing what kinds of workers and skills are entering their freelancer pools. They do this by both restricting entry for some workers and attracting other workers via advertising and similar means. For instance, Upwork vets new freelancers by assessing their skills and experience against the levels of demand on its platform. Figure 28 presents an email from Upwork explaining its decision to reject a new freelancer, which

includes advice for getting accepted next time. As a test, we submitted three real profiles (i.e. accurately reflecting the work experience and skills of two of our researchers) to Upwork that were heavy on skills the platform had listed as being fastest-growing in demand. All three profiles were rejected, with the stated justification being that “at this time there are already many freelancers with a similar skillset to yours and we cannot accept your application.”

Experienced crowdworkers in our interviews also noted that they had recommended using Upwork and other platforms to friends and colleagues, only to have them struggle to be accepted into the platform. The crowdworkers we spoke to noted that they had not faced the same difficulties getting started themselves in prior years, suggesting that the bottleneck to success may be moving from gaining clients to gaining entry into the most desirable platforms in the first place. This could be due to the number of registered workers on the platforms growing faster than the number of clients. However, the interview findings must be interpreted with caution here, as the sample by definition consists of people who successfully entered the platform. All the platforms we examined also continued to advertise their facilities to freelancers. In specific instances some platforms will use advertising to fill skills gaps in its talent pool. For example, Twago told us it would proactively seek some specialist skills to satisfy demand on its Enterprise platform.

Once accepted onto the platform, freelancers settle into a loose and constantly-evolving hierarchy of workers. Those freelancers who have both desirable skills to sell and the skills necessary to market them effectively on the platform gain more work and better ratings, leading to in-platform badges such as Top Seller. Those freelancers with less in-demand skills, who struggle to market themselves, who only use the platform infrequently, or who otherwise do not frequently win jobs on the platform do not gain these badges. This means they may be filtered out by clients looking for suitable freelancers (e.g. Upwork’s in-platform search engine allows clients to filter out freelancers with low ratings, few jobs, low earnings, or without the Top Rated badge). Nevertheless, while platforms – and some more than others – make an effort to regulate their skills ecosystem, there is still a wide range of freelancers participating in most platforms, from occasional hobbyists to career freelancers and well-known professionals.



Thank you for submitting your application to join Upwork.

As we do with everyone who wishes to join Upwork, we carefully reviewed your profile to determine whether there is sufficient need for your skills and experience in the marketplace. Unfortunately, at this time there are already many freelancers with a similar skillset to yours and we cannot accept your application.

I know this news is likely disappointing to you. However, we want to make sure the freelancers we accept have the best chance at success on our platform. This requires us to not only closely review a freelancer's talents and experience, but also balance those with the availability of projects. For example, at times our marketplace may have too many freelancers with similar skills competing for the number of projects that are available. To avoid the frustration that goes along with that, we must limit the number of new freelancers that can join our website. While you cannot submit proposals for jobs right now, the number of available jobs and freelancers vary throughout the year. We can offer a few suggestions for going forward:

1. If you have more relevant skills or experience to add now or in the future as you develop them, you can update and re-submit your application and we'll take another look to see if there is a demand for your new skills.
2. If you haven't already, you can learn more about building a complete profile by checking out the following articles:
    - Enhance Your Upwork Freelancer Profile for Greater Success & Sample Profiles

For more details about applying to join Upwork, please click here. Thanks

Figure 28: Rejection email from Upwork

4.3. Effectiveness of skills matching in platform markets

How well do the mechanisms described above help to match the supply of skills with demand? Crowdworkers we spoke to did not always feel like they were using their full set of skills in their work. This was often because the work available was lower skilled and they took the job because they needed the money, particularly when they were newer to the platform and needed to develop a portfolio of in-platform work and accrue positive client ratings. Crowdworkers might also purposefully select a less difficult job because a) they found the

project interesting, b) it was in a new skill area they wanted to move into but needed more proof of their ability to do on their profile, and/or c) they wanted to reduce their work/stress load while still remaining active on the platform and earning some income. This speaks to the diversity of motivations among people engaging in crowdwork.

Some platforms also allow clients to immediately hire a freelancer for a project without that freelancer first approving of the exact details of the work. This means that, sometimes, freelancers are hired for a job they cannot actually do, resulting in them having to cancel the job. Cancellations on these platforms reflect badly in crowdworkers' in-platform rating, meaning that this imperfect method of semi-automated skills matching unequally negatively impacts freelancers when a client makes a mistake.

Freelancers, meanwhile, praise platforms' job search and browse functions but are critical of the quality of the job postings themselves. Their main complaints are that clients use irrelevant skill tags on job postings – meaning that search results are flooded with jobs irrelevant to the workers – and that clients often do not know what it is they want or need, leading to inaccurately or vaguely worded job descriptions. Beyond wasting freelancers' time, these issues are also highly problematic in platforms that limit the number of jobs a worker can apply to per month (or that sell extra application "credit"). Poorly written job postings lead freelancers to waste their limited applications on undesirable and even unfeasible work opportunities, limiting their chances of finding relevant and (both financially and developmentally) rewarding work.

5. Findings on the challenges of facilitating inter-platform portability of skills

The main mechanism that platform markets provide for workers to signal their skills – feedback from previous clients – is tied to specific platforms. As a result, workers are unable to transfer the evidence of skills acquired on one platform to another. This potentially limits workers' mobility and ability to move up from platforms for less specialized work towards expert platforms as their skills develop. The lack of portability also potentially limits the ability of other stakeholders, such as learning providers and unions, to get involved in skills matching, as the forms of skill validation that they provide are not widely used by platform clients. In this section we thus describe findings concerning the challenges of facilitating inter-platform recognition and portability of crowdworkers' skills (RQ5).

5.1. The case for portability

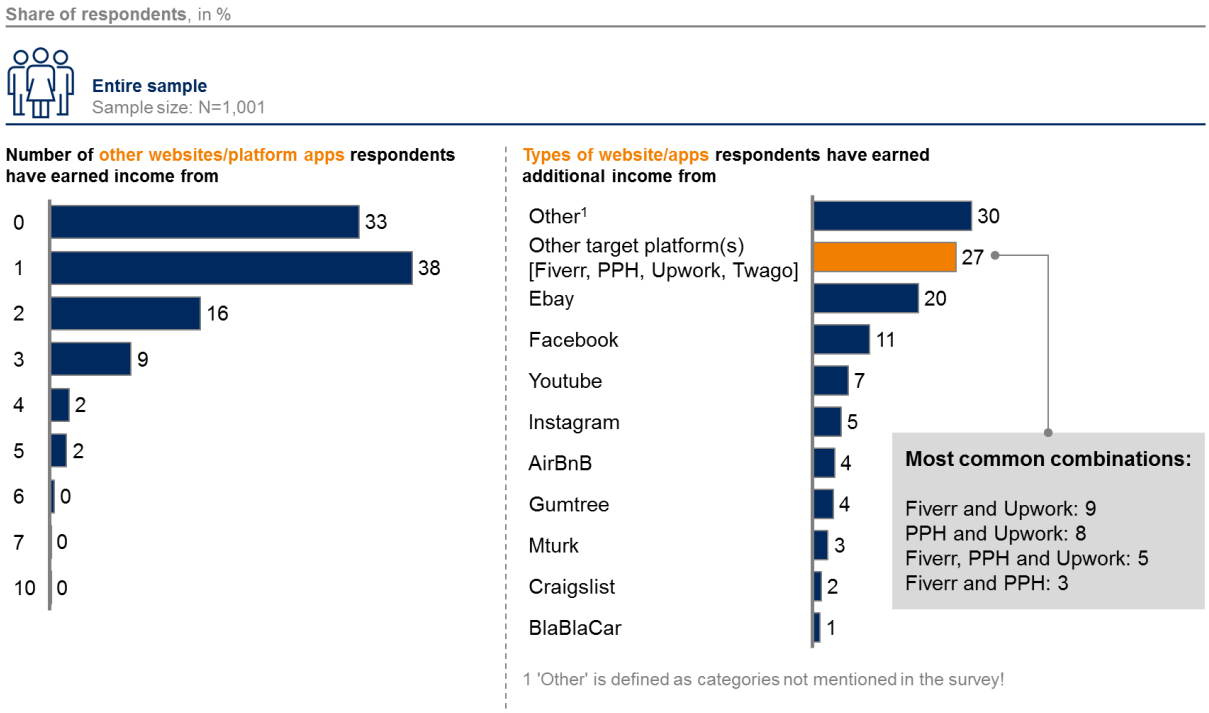


Figure 29: Crowdworkers' use of multiple platforms

Our evidence suggests that a significant proportion of crowdworkers are active across platforms making skills portability an issue of importance. Two thirds of respondents to our survey indicated that they previously earned income from sources other than the platform in question (Figure 29). A third of crowdworkers who filled out our questionnaire are active on

several of the four target platforms, Fiverr and Upwork being the most common combination (9%).

Currently, workers using digital platforms are unable to take any proof of skills aquired using one platform, including their reputation feedback, to any other other platform or job market. This means for example, if a freelancer has a 'Top CERT' status on PeoplePerHour, they could not transfer this evidence of a skill to another platform. Freelancers signing up to new platforms can of course typically attach any information they like to their profiles, in some cases including copies of certificates earned from learning providers. But they cannot transfer any client feedback or other signals and evidence from another platform that would "validate" the information they have supplied, in the sense of providing independent proof of it. As one stakeholder put it, "A [worker] can show their skills and formal education anywhere, like on LinkedIn. All the relationships that [workers] build through the platform economy can't be shown anywhere else other than the platform on which they were achieved."

Freelancers interviewed for this study were keen to see more inter-platform portability of reputation and skill ratings. The lack of such interoperability lead some workers to feel trapped in a particular platform as moving to a new platform would mean they would be seen by clients as unverified, risky hires. This led some freelancers we interviewed to say they continued to work on platforms long beyond when they wanted to move on, due to changes in platform fees, platform operability, and availability of relevant jobs. Portability could thus unlock greater mobility, possibly helping workers to put their skills to better use and move up towards more specialized work.

However, since inter-platform portability remains for the most part only an idea, there is little evidence on what the actual impacts would be. Some experimental evidence suggests that inter-platform portability of reputation information can indeed help users to successfully enter into new platforms where they lack a previous track record, provided there is a good "source-target fit" between the platforms (Teubner, Adam, & Hawlitschek, forthcoming). In the case of a bad fit, such as for instance (hypothetically) a food delivery driver attempting to use their food delivery feedback to gain projects on a software development platform, the effects of portability can be negative. Furthermore, if users are allowed to exercise discretion over which feedbacks to import into a new platform, then this could potentially reduce clients' trust in the feedback as a signal, because they would know that it is to some extent cherry-picked. The actual effects of portability remain unclear, but it is unlikely to be a silver bullet that solves issues of platform dependence and mobility in one stroke.

5.2. Challenges in achieving portability

To achieve portability of skills signals between platforms in practice, a number of challenges would have to be overcome. Organisations working on facilitating inter-platform recognition and portability of skills highlight the following challenges in particular:

- the technical know-how and capacity to define a skills framework;
- the ability to translate this into technical architectures;

- the means to broker cooperation with platforms;
- the ability to manage the competing interest groups;
- the expertise to navigate the legal constraints;
- the power to coordinate the project across European states; and
- clarification of the implications of GDPR.

In the following subsections, we discuss some of these issues in more detail.

5.2.1. The lack of a business case

Research on platform strategy suggests that interoperability is in general not in the business interests of the market leader, as it could make it easier for competitors to gain market share (Shapiro & Varian, 1999). Conversely, challenger platforms are more likely to be interested in interoperability schemes. The platform economy as a whole consists of dozens of online labour platforms, but only a handful of them command the majority of the market share (Kässi & Lehdonvirta, 2018). For an interoperability scheme to have meaningful coverage, it would require the participation of these leading platforms, but they have the least incentive to participate.

One of our stakeholder informants, Deemly, is a Danish tech start-up, whose services are designed to facilitate trust across peer-to-peer marketplaces by allowing clients and freelancers to accumulate and transfer their digital reputations between platforms. Deemily believes that people will be more inclined to try out new platforms if they can bring their reputations with them. Similarly, less active users of more established platforms will have an easier time participating when they can utilize their entire digital reputation to compete with the platform's most active users. However, without some more pressing reasons, it may be difficult to recruit larger platforms to open up worker profiles. Over the past decade, many start-ups besides Deemly have attempted to create reputation aggregation and interoperability schemes for different kinds of platforms and services, but none have taken off so far.

5.2.2. The fluid nature of skills ontologies

Another issue in roll-out of a skills portability scheme is that consensus would be needed on which skills should be recognised. Some skills are stable while others are in flux and constantly being redefined. Many skills are only recognised indirectly or tacitly; e.g. etiquette, grammar, and spelling. The online freelancer market is in many areas highly specialist and fragmented.

A methodology would be required to determine which skills are transferable and which skills are more situated/context-specific. Because it may run counter to the fragmentation inherent in the freelancing market, formalising this distinction would be difficult. Such a methodology would have to feed into a comprehensive model or ontology of skills in freelancing. Any such system requires an agreed set of standards for skills that clients, freelancers, skills providers, and platforms all endorse. Professional qualification bodies in nursing, accounting, etc. will likely have approaches, systems and processes that can be used

to this end, adapted or used as guidance rather than directly copied. However, the centrality of the platforms' data practice may require some technical innovations.

Our research also suggests that skills recognition systems in online labour markets would not be effective without accounting for other signals of employability (such as reputation) which are, in the client's assessments, indivisible from skills. Skills, reputation and trustworthiness are difficult to disaggregate. As one platform client stakeholder said, a freelancer's skills are useless in isolation unless clients know they are a genuine and trustworthy person – even to the extent that clients will choose a demonstrably less skilled person instead of someone whom they are not sure they can trust. Other recent research concludes that digital trust is difficult to port between platforms, because it is dependent on the specific "mechanisms and rules implemented by the platforms (rating, screening, filtering, signaling mechanisms)" (Penard, 2019).

5.2.3. Technology and data access

There are also technical challenges that militate against such portability of skills. An interoperable system would require a skills vocabulary translatable into a machine-readable ontology. This translation could be done in many different ways, with many possible pathways for standards and technologies. An interoperable system will necessitate access to each platform's data, so that, for example, a freelancer's reputation can be extracted and imported into the system whenever it is updated. To allow for such transfers shared protocols and formats for consolidating and sharing data are required.

In some economic sectors, the platforms that will be required to share their data are in direct competition and their competitive advantage is sustained by exclusive relationships, data property, and their proprietary systems of skills identification and signaling. To cooperate in an interoperable system, platforms need to be convinced there is a business case for inter-platform recognition and portability of freelancers' skills. Since the platforms tell us they are operating successfully without such a system, this will be a challenge.

Platforms would need convincing to change their terms of service to allow more data sharing between them, academia, and civil society. Because they use different platforms for different reasons, some workers may not want inter-platform recognition and portability. While models of interoperable skills recognition systems are emerging in national contexts (for example Sweden), European freedom of movement demands a trans-European system of inter-platform recognition and portability.

One of the stakeholders we interviewed is an autonomous component of Sweden's public employment service called JobTech. Drawing on government skills and employment data, JobTech is developing data operability intrafructures and standards to allow inter-platform recognition of skills. Job Tech's goals are hindered by the lack of inter-operability standards across the digital economy: different platforms use different data standards and encode different conceptualisations and taxomonies of skills within their data models. For inter-operability to be realised, the technical challenge of harmonising these into a standard model will need to be addressed. This will require platforms to release such data for the purposes of

harmonisation, which introduces the capacities of GDPR to facilitate or contrain such data sharing.

5.2.4. Data protection regulation

The EU's new General Data Protection Regulation (GDPR) requires special attention because it presents opportunities and challenges to any enterprise intending to make skills and reputation interoperable. It contains provisions related to data portability, but interpretations differ as to their practical scope and impact (De Hert et al., 2018). GDPR's implications to crowdworker skill data remain unexplored in the literature.

We asked our informants to reflect on the impact of GDPR on platforms for freelancers and whether it could help empower then through interoperable data. A senior representative of UNI Europe told us this was all "uncharted territory" and nothing would made clear until GDPR's impact on the platform economy is tested in courts.

Deemly told us GDPR is currently too ill defined to be useful to her company. She said Article 20 of GDPR states that companies should allow users to access their data in a machine-readable format but she wasn't sure if this is enough to push platforms to open up their data to third parties. Also if platforms are mandated to open-up their APIs (Aplication Interfaces used by third parties to access data stored by platforms) she said it was too easy for platforms to innovate around the law. Moreover, some platforms slightly alter their APIs every month. Therefore companies wanting access to the data must devote valuable resources to synching their systems with the platform's API.

However, for Deemly GDPR has produced a shift already. The company has been using the affordances of GDPR to "drive the conversation" about access rights and helping to convince platforms to open up. Also, Deemly argues that recent well-publicised data scandals and the subsequent focus on data ethics have also been important to these discussions. Deemly says it is able to say to freelancing platforms that much of their data belongs to their freelancers and, from an ethical and GDPR standpoint, they should therefore allow these users to access their data, delete it, and take it with them.

6. Conclusions and policy recommendations (RQ6)

In this section we draw on evidence from our research to identify opportunities for potential interventions that could improve skill development and matching in online platform work (RQ6). From workers' perspective, the need for such interventions is highlighted by the fact that more than 60% of a subset of survey participants (N=536) report lack of support by policy makers such as national governments; although our survey doesn't allow us to ascertain whether these workers were positive, negative or neutral about this lack of policy support. Our recommendations are divided into policy recommendations (sections 6.1 through 6.4) and recommendations for further research (section 6.5) in the area of learning and skill development in online platform work. The policy recommendations are structured around four key thematic areas cross-cutting the stakeholder groups including labour market integration; continuing professional development; educaton and vocational training; and skills matching. The recommendations for further research are aimed at Cedefop and the European Commission as potential funders of proposed future research.

6.1. Platform work and labour market integration

6.1.1. Policymakers should collaborate with platforms to experiment with subsidized "micro-internships" in platform work

Platform work is frequently seen as a tool for labour market integration. However, new crowdworkers face difficulties breaking into the market because they lack client feedback, which is the primary means of signalling skills and trustworthiness on platform markets. Research suggests that this results in inefficient utilization of workers' skills (Pallais 2014). To address this, and to help promote crowdworkers' skill development, we propose that platform companies and policy makers collaborate on developing an experimental programme of "micro-internships". In such a programme, platforms' clients are offered a subsidized rate on crowdworkers who lack previous platform-based work experience. In exchange, clients are required to provide the workers with ample formative and developmental private feedback that helps them develop their skills and public feedback that helps them signal their skills and trustworthiness to other potential clients.

Such micro-internships would improve on a practice that is already informally practiced to some extent. In particular, more than 70 percent of crowdworkers in our survey stated that they have been hired for a small test project by clients to evaluate their performance, before being hired for a larger project. Micro-internships would improve on this by making the feedback from the test projects available to other clients, by opening the scheme to new workers, and by including a skills development aspect. Experimentation would be needed to determine if and how clients could be convinced of a business case for such an approach or how much subsidization would be required to offset the additional costs to employers. Ideally

the public feedback should be portable across platforms; alternatively, if the feedback is tied to a platform, then the platform should have an incentive to participate in subsidizing it. However, as with all subsidized employment programmes, it will be crucial to set limits on the use of micro-internships so that they are not exploited by clients looking for cheap labour. As part of their education policy, governments could formalise, fund, assess and monitor apprenticeships for freelancers and integrate them within existing schemes that are often incentivised through tax breaks.

6.1.2. Policymakers should work with researchers to develop realistic understandings of the potential of crowdwork as a medium of labour market integration

There are indications that crowdwork could already be acting as a medium of labour market integration in some segments. For instance, we found that 32 percent of crowdworker survey respondents based in six European countries had an immigrant background. Further research should uncover whether this represents eg. intra-European immigration, skilled non-EU migrants or skilled refugees using platforms as a means to try to attach to local labour markets. We also found that women appeared to be using crowdwork differently from men, as they, for instance, reported more frequent skill development in crowdwork. However, we also found that successful crowdworkers were typically highly educated and possessed significant work experience in the regular labour market before entering crowdwork. This suggests that the potential of using crowdwork as a policy tool to address youth unemployment may be limited, or at least that any such interventions should be coupled with simultaneous investment into the youths' digital and core skills. We recommend that prior to any interventions, policymakers work with researchers to develop a realistic understanding of crowdwork's potential for labour market integration in the desired target segment.

6.1.3. Governments should improve information provided to crowdworkers about country-specific tax and other administrative implications of platform work

This support should include clear instructions and other educational materials on taxes, business registration, social welfare implications, and other government processes for crowdworkers in each country (and in-country region, if different) to make it easy for crowdworkers to comfortably navigate the legality of their work status. This would also involve recognising this new form of work in official government documentation. Currently, more than 60 percent of crowdworkers in our study indicated that they did not feel supported by national governments. If platform work is not properly integrated into existing legal and administrative frameworks, it risks becoming a new shadow economy.

6.2. Platform work and continuing professional development

6.2.1. Informal and adult vocational learning providers should consider offering short online courses and workshops that meet crowdworkers' "just-in-time" learning needs

People who have successfully entered crowdwork find that on-the-job skills development is an essential part of all types of crowdwork. Almost 60% of the crowdworkers we surveyed developed their skill set at least weekly. As in all workplaces, in platform work learning needs are closely intertwined with task requirements and driven by clients' priorities and requests. Crowdworkers already have a baseline level of saleable skills and professional "soft" skills, and are looking for short, focused, online courses and tutorials, typically to acquire or improve specific skills within the domain in which they already work. They tend to gravitate towards YouTube tutorials and Googling – which are free and fast – when learning and searching for new information. Our study showed that freelancers considered MOOCs to be too long, too broad, and to be covering disproportionately many introductory-level skills. Learning providers could explore the option of partnering with platforms to develop mutually beneficial arrangements similar to PeoplePerHour's partnership with Skillshare (outlined in section 3.1.1). Learning providers should also consider whether their current fee structure is sustainable, as ad-supported free content becomes normalised across the Internet, including in the online learning marketplace.

6.2.2. Trade unions should draw on their existing resources, policy expertise, and partnerships to provide training opportunities to freelancers

Trade unions often play a role in continuing learning in regular labour markets. However, union membership among crowdworkers is rare. Only 8% of our survey respondents were members of an association or union, and in less than half of the cases was the membership related to their online freelancing activities. As one informant observed, "unions really have a hard time getting people together", as the relevance of unions is not clear to platform workers.

However, trade unions, such as the National Union of Journalists in the UK, have a tradition of supporting the training and development of freelancers through, for example, certifying training courses, providing workshops, and curating resources for trainees who are looking for trusted pathways to a career in freelancing. Unions could adapt and transfer these existing provisions for online freelancers, who would benefit from access to low-cost high-quality provision. Through such training-led interventions, unions could start reaching online freelancers, and use the opportunity to also start engaging with them more broadly.

6.2.3. Platforms should invest into helping clients communicate their expectations and feedback to workers more clearly

Platform companies could offer more support for crowdworkers' on-the-job skill development indirectly, through guiding clients. There are at least two ways in which platforms could do this. First, platforms could provide clearer and more structured guidance to clients on how to communicate needs and expectations with freelancers, both in their job advertisements and throughout the course of a gig. Platforms have recently invested into more guidance for clients in this area (e.g. Upwork job templates), but our findings suggest that the guidance is still insufficient: freelancers we interviewed frequently mentioned that much time was wasted – both theirs and their clients' – identifying the clients' expectations and requirements. Similarly, almost 80% of survey respondents stated that the pace of their work is dependent on direct demands from clients. It would make platforms more efficient and improve the return-on-investment for freelancers and clients if clients were incentivised to write clearer job postings. Providing more guidance would also support the individuals and small companies who use these platforms as clients but do not necessarily have the same levels of recruitment and managerial experience, training, or processes as a larger company would.

Second, given the importance of feedback in skill development (see Section 2), platforms could encourage clients to provide formative, developmental rather than only summative, evaluative feedback to freelancers. With more than 60% of freelancers being worried about the impact of unfair feedback on their future income, formative and evaluative feedback would have to be carefully distinguished. Platforms should consider providing guidance to clients on what formative versus summative feedback looks like, particularly in the context of a client–freelancer relationship, and how it is delivered, for instance in private versus publicly.

6.3. Platform work, education and vocational training

6.3.1. Compulsory schooling, vocational training, and higher education should focus on developing people's' self-regulatory learning skills, capabilities and mindsets

Successful crowdworkers also need skills and dispositions developed through formal education prior to entering working life. In particular, self-regulatory learning skills and mindsets are critical for both online and offline work, and are best developed from early childhood – and certainly before entering work, where a lack of self-regulatory ability will be less tolerated and could have a negative impact on an individual's early career. Self-regulatory learning (SRL) skills are a fundamental skillset to have in the 21st century. SRL skills include the ability to be strategic and dynamic in identifying one's own learning goals; maintaining a lifelong learning orientation; continuously studying the market to understand and identify the changing skill requirements; strengthening one's own personal self-efficacy; being proactive in seeking feedback; and being self-reflective and able to dynamically change one's learning strategies when these are not working. These attributes will be increasingly required of everyone, not just those in highly-skilled or managerial jobs. In our study we uncovered that people who are highly self-regulated learners – as measured by their self-regulated learning disposition score on our questionnaire – engage in learning and skill development on average

on a weekly basis, while those with a low self-regulated learning score do so only occasionally. New freelancers must have a baseline level of self-regulatory learning skills in order to successfully win their first gigs.

Some elements of these skills, particularly where specific techniques are concerned, can be taught in a classroom, for example, planning and prioritising learning goals or techniques and tools to support systematic self-reflection such as through writing. However, by and large, self-regulatory capabilities can only be developed through trial-and-error, through deliberate practice, through mimesis, through reflecting on one's own and other's errors and learning from mistakes – in other words, through experience and through practicing self-regulation, self-direction and self-reliance every day across different contexts in one's life course. Educational institutions, including kindergartens, primary schools, universities and vocational training colleges could help people develop self-regulation, self-direction and self-reliance through designing educational experiences and learning events in such a way that the self-regulatory capabilities are encouraged, fostered and rewarded, helping people to help themselves whilst providing the necessary scaffolding and expert guidance but planning for gradual removal of these scaffold as the individuals become more confident in exercising these capabilities. In the workplace, indirect forms of support for the development of these skills – for example through job design, workflow design and, in platform workplaces, interface design – can be more effective and more appropriate for adult professionals than direct training could be. Examples of such mechanisms evidenced in our study are publishing data on skill demands; referring workers to learning providers; eliciting clients' feedback on workers' performance; facilitating peer-to-peer learning through online learning marketplaces.

6.3.2. Policymakers should continue to focus on digital skills as a priority area for formal education

Although successful crowdworkers continue to learn new skills via on-the-job learning, in one area they experience less frequent skill development than in others: digital skills. Digital skills are mostly developed before entry into crowdwork. In countries where crowdwork is less common, stakeholder interviewees argued that this was partly due to a lack of digital skills. Crowdwork is thus not a solution to improving digital skills, on the contrary: it is another reason why education policy makers should continue to focus on digital skills or digital literacy as a priority area in formal education.

An interview participant representing the OECD told us, "where we test people on their digital skills, we're always shocked by how low these skills are", and "certainly there may be opportunities to help people access some of these jobs by training them in digital skills". Digital upskilling programmes could include guides to freelancing. Young people especially should be educated about the risks and opportunities involved in freelancing, the platforms' business models, and the broader issues and opportunities associated with being self-employed, so that they may make informed career choices.

6.4. Platform work and skills matching

6.4.1. Platforms should consider adopting a portable portfolio function to allow workers to display, advertise, and transfer all of their qualifications and work experience

A key value proposition of online labour platforms is that they match skilled workers with employers in need of their skills. However, the matching mechanisms, such as reputation mechanisms that collect feedback from previous clients, are specific to each particular platform. More than half of crowdworkers we surveyed believed that they could not switch to another platform without negatively impacting their income. This limits worker mobility between platforms and potentially also from crowdwork to regular employment, possibly resulting in skills underutilization. Portable portfolio-based systems would enable workers to better market themselves as well as support them in managing their learning and transferring the evidence of skills across platforms. Gupta (2017) outlines an example of a potential portfolio-based system for crowdworkers. Policymakers, NGOs, or trade unions could mediate and work across platforms to encourage platforms to develop and adopt such portfolio systems. However, achieving portability also poses significant challenges.

6.4.2. Policymakers should consider engaging with platform companies to examine ways of overcoming obstacles to cross-platform portability

Achieving cross-platform portability of crowdworkers' work experience, client feedback, reputation ratings, and similar data involves significant challenges. Major challenges include the following: lack of a business case for large platforms; constantly evolving nature of skills signalling systems across platforms, hampering standardization; and data protection regulation. We recommend that policymakers consider engaging with major platform companies to create a policy task force that examines ways of potentially overcoming these obstacles. However, we also note that the evidence of the effectiveness of portability of skills in improving worker mobility remains limited, so achieving portability may not be the silver bullet as it is sometimes hoped to be for improving mobility.

6.4.3. Platforms should provide more stringent skill tests and/or develop ways to incorporate external skill test results to improve skills matching

Platform-provided skill tests certify freelancers' skills rather than their general trustworthiness. Therefore, skills tests presently do little to help freelancers achieve their first project. That said, on those platforms where skill tests were available, about 70 percent of crowdworkers indicated that they had taken at least one of these tests. Our study revealed that freelancers did not perceive any of the current platform-provided tests on offer as useful for a) accurately signalling their skills, or b) attracting more work from clients. Only about a third of our survey respondents considered them helpful or required for getting awarded projects. Even

fewer respondents considered online skills tests and certificates provided by parties other than the platforms helpful in job matching. Our interview findings suggest that externally provided and externally regulated skills tests such as for instance Google Ads certification are often viewed by freelancers as more valuable in terms of the skills they cover, but freelancers' inability to display such certificates on their platform profiles in a way that is validated by the platform might inhibit their usefulness in skills matching.

6.5. Recommendations for future research

In this section we outline a few directions for future research arising from our study.

6.5.1. Understanding crowdworkers' practices of self-organisation and networking for learning and skill development in platform work

In order to develop a comprehensive understanding of workplace learning and skill development practices in crowdwork, we need to research what people learn through online platform work (skills, knowledge and dispositions), how they learn it (learning activities and learning strategies), why they learn it (motivations, life-course trajectories, socio-economic factors and work design factors), and who they learn with (networks and self-organised communities). It is impossible to cover all four components in one relatively small-scale study such as ours, therefore analyses in this project have focused primarily on the former two components – what and how people learn, and to a limited extent also on why people learn. It would be important however to also understand with whom workers learn, including crowdworkers' self-organisation practices, personal and professional networks and collaborations, self-organised communities and the role of these networks and collaborations in the learning process. Key research questions that should be tackled include: (i) What are workers' self-organisation processes and practices to support their learning and development in crowdwork? (ii) What social and professional networks and communities – offline and online – do workers draw on to learn and develop skills, how are these networks shaped and constituted and how are they developed and maintained? (iii) What technologies do workers use and how do they use these to support their learning and development through these networks and communities? (iv) How can crowdworkers' self-organised learning activities be supported and enhanced, for example through work design, platform interface design or policies? Such studies should draw on mixed method research designs incorporating qualitative and quantitative, computational social science methods, trace data and social network analyses to scope, surface, analyse and understand the self-organisation practices and their role in supporting learning and work on platforms.

6.5.2. Understanding the implications of work and learning practices in crowdwork for learning and teaching in educational settings

Universities and vocational training institutions would benefit from EU funding to undertake translational research and experimentation to apply findings and insights from studies like CrowdLearn to identify how pedagogic approaches and teaching methods could be advanced and reconceptualised to enable students to develop the knowledge, skills and dispositions to function effectively and productively in the platform economy. Key research questions such future research could tackle include: (i) What teaching approaches and learning models can support students in developing the skills, knowledge and dispositions required in platform workplaces? (ii) What are the key principles underpinning the teaching approaches and learning models aligned with the requirements of new forms of digital and AI-based work in the platform economy? (iii) What are the higher education policy implications of the emergent work and learning practices, and what are the differential roles of the key actors and stakeholders – students, academics, administrators, employers, platforms, national and supranational governments – in enhancing the alignment between higher education and workplaces within both the conventional economy and the platform economy?

6.5.3. Understanding the clients of crowdwork platforms

There is very little extant research around the composition and demographics of the platforms' client base, their motivations in outsourcing work through platforms, how they identify whom to hire, and the ways in which outputs of platform work are used by clients. Additional research is needed to elucidate these issues and to develop a better understanding of the clients as one of the main actors within the production system of platform work.

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7. Appendices

7.1. Methodology

7.1.1. Crowdworker interview methodology

The data on crowdworkers' continuing skill development, insight on learning practices, and skill utilization strategies was collected using an online, synchronous, semi-structured interview. The semi-structured method is ideal in situations where an emergent knowledge base is being established and where boundaries of the phenomena remain poorly delineated, as was the case here. As noted by Morse (2012, p. 197), "Semi-structured interviews are [best] used when the researcher knows enough about the topic or phenomenon to identify the domain (i.e. knows the limits of the topic and what is and is not pertinent to the research question) but does not know and cannot anticipate all of the answers."

The semi-structured interview method allowed us to explore with the crowdworkers a set of predefined interview questions around the factors impacting their skills development and learning in crowdwork settings, including gaps and opportunities in these areas. At the same time, this method was sufficiently open-ended and supple to identify, investigate, and pursue unanticipated questions that emerged during the interview.

Given that crowdwork and its related communication take place online, online interviewing provided the most natural setting for generating data on learning practices with and of crowdworkers. Moreover, online interviewing allowed for a sampling strategy that targeted crowdworkers from a variety of EU state contexts, so that we could examine a range of perspectives on the role of learning across crowdworkers' life course.

Sampling and recruitment

We interviewed 77 crowdworkers who were working on one of four online freelancing platforms (i.e. Upwork, PeoplePerHour [PPH], Fiverr, and Twago) at the time of their recruitment. Over 700 crowdworkers were contacted, with the majority contacted by one of three ways: 1) by sending a private message to their LinkedIn profile, 2) by posting a "job" on one of the target platforms advertising the interview segment of the project and hiring eligible crowdworkers who applied, and 3) by inviting eligible crowdworkers to apply to our posted "jobs" through the platform's invitation-to-apply function. Additionally, Twago assisted our recruitment efforts by sending a recruitment message by email to 200 members of their German website, and Fiverr sent a recruitment message to EU-based users of Learn From Fiverr.

Crowdworkers were considered eligible if they met the following criteria: 1) were 18 years old or older, 2) currently resided in one of the six target countries (i.e. Finland, Germany, Italy, Romania, Spain, and the United Kingdom), 3) were currently doing work through one of the

four target platforms, and 4) were willing to participate in a synchronous online interview, either through video or by audio only.

All eligible applicants were asked to complete an online pre-interview survey prior to the scheduling of their interview. This survey collected demographic data (e.g. gender, age, level of education, current employment status), contact details, information useful to scheduling individual interviews (e.g. dates and times available), and further information on their freelancing (e.g. uploading CVs, links to freelancing profiles). 125 individuals completed the pre-interview survey; however, this included responses from 48 individuals who either did not meet the eligibility criteria (e.g. their LinkedIn profile said they lived in a target country but they, in fact, did not) or who ultimately chose not to participate in an interview.

As demonstrated in Table 2 and Table 3, we achieved a relatively even gender split in our sample, with more than three-quarters under the age of 35. The most represented platforms are Upwork (n=22) and PeoplePerHour (n=23), with Fiverr (n=18) and Twago (n=14) yielding fewer respondents (Table 4). However, the majority of the freelancers (n=53) we studied used more than one platform to offer their services. Interestingly, a considerable proportion of respondents are based in the UK (n=31) (Table 5) This finding is in line with comparable data suggesting that the UK is the biggest European country in terms of number of workers in the online freelancing market.[9] According to the Online Labour Index, UK-based workers were the sixth largest supplier of online labour, contributing roughly six percent of the global workforce in July 2017. Combined, all European Union member state-based workers (minus those in the UK) equalled <1% of the global online workforce in that particular dataset (consisting of workers from four online freelancing platforms: Fiverr, Freelancer, Guru, and PeoplePerHour*)*.

Table 2 ***Crowdworker sample demographics: gender (n=73).***

Gender	(n)
Female	36
Male	38

Table 3 ***Crowdworker sample demographics: age (n=73).***

Age group	(n)
18-24	15
25-34	42
35-44	9
45-54	4
55-64	3
65-74	1

[9] The comparative data was retrieved from the Online Labour Index on Feb 21, 2019: https://ilabour.oii.ox.ac.uk/where-are-online-workers-located-the-international-division-of-digital-gig-work/.

Table 4 ***Crowdworker sample primary platform (n=77).***

Primary platform	(n)
Fiverr	18
PeoplePerHour	23
Twago	14
Upwork	22

Table 5 ***Crowdworker sample demographics: country of residence (n=77)*****.**

Country of residence	(n)
Finland	4
Germany	22
Italy	7
Romania	8
Spain	5
UK	31

Data on our sample (Table 6) indicates that our sample of workers are well educated, with over half of our sample holding a minimum of a bachelor's degree, and 28% holding a postgraduate degree. Moreover, the majority of workers interviewed considered their employment status to be self-employment (n=43). It was also not uncommon to consider online freelancing as full-time employment (n=12) (Table 7). In classifying the specific sector that freelancers were involved in, we obtained a fairly consistent spread across Online Labour Index worker categories.[10] The most popular categories that freelancers worked in were (1) creative and multimedia, (2) writing and translation, and (3) software development and technology (Table 8).

Table 6 ***Crowdworker sample education (n=74).***

Highest level of education	(n)
High school or less (no degree)	3
High school graduate	10
Trade training	1
Professional/Vocational degree	3
Bachelor's degree	36
Master's/Doctoral degree	21

[10] See: https://ilabour.oii.ox.ac.uk/online-labour-index/.

Table 7 ***Crowdworker sample employment status (n=69).***

Type of work	(n)
Full-time employment	12
Part-time employment	5
Self-employment	43
Student	4
Homemaker/Carer	1
Out of work	4

Table 8 ***Crowdworker sample primary category of crowdwork (n=77).***

Online Labour Index category	(n)
Clerical & Data Entry	8
Creative & Multimedia	16
Professional Services	11
Sales & Marketing Support	12
Software Development & Technology	14
Writing & Translation	16

Overall, we can see that there are some national level variations in the makeup of the freelancers interviewed, but the majority were college educated,[11] 25-34 years old, and worked across a range of occupation categories.

Interview structure

Interviews lasted 45-60 minutes each and were conducted using Skype, Google Hangouts, WhatsApp, or Facetime, with participants choosing the platform and whether to interview through a video link or by audio only. A series of largely open-ended questions (listed in Deliverable II.1) were asked around four themes:

1. *What* do crowdworkers learn as part of crowdwork?
2. *Why* do crowdworkers learn as part of their crowdwork?
3. *How* do crowdworkers learn?
4. *With whom* do crowdworkers learn?

[11] While only three crowdworkers we interviewed self-identified as holding a professional or vocational degree, some of the undergraduate and postgraduate degrees held by other interviewees were also trade-specific (e.g. master's degree in geographic information systems, bachelor's degree in web development, etc.).

Digital artefacts (e.g. online profiles) collected through the pre-interview survey were used to inform the interviewers' line of questioning by personalising the interview script for each crowdworker. Interviewers also followed up on themes that emerged during the interviews by improvising new questions and prompts in order to further explore unanticipated findings.

Data and analysis

Audio recordings from the interviews were transcribed and transcripts imported into NVivo for analysis. The transcripts were coded using an initial coding scheme (Table 9). The first two codes were further divided into sub-codes in order to identify differences in what skills were learned and how pre-freelancing compared to during freelancing. During the analysis stage, the data coded by the "What people learn" sub-codes were organised into a typology of skills that can be found in the appendix (section 7.2). The third code ("With whom they learn") was given two sub-codes in order to delineate fellow group members – with whom no learning took place – from explicit co-learners. The final three codes ("Why they learn," "Skills matching," and "What would they change?") were left without sub-codes, in order that new typologies might be developed organically, starting with high-level coded excerpts.

Table 9: Initial coding scheme for crowdworker interviews

Code	Sub-code
How skills are learned	Ways of learning during freelancing Ways of learning pre-freelancing
What people learn	Skills learned during freelancing Skills learned pre-freelancing
With whom they learn	Who they learn with Who they share membership with
Why they learn	N/A
Skills matching	
What would they change?	

Developing a typology of skills

To address RQ1, we used the interview data to develop a typology of skills used in crowdwork. The typology was developed inductively from the data. Initially, the interview

transcripts were coded by two researchers, using two broad sets of predefined codes: skills developed during crowdwork and skills developed prior to crowdwork that were used in crowdwork. Within each of these two broad sets of codes, all skills mentioned by the workers were captured at the lowest level of abstraction. For example, when a respondent discussed software development skills, each specific software skill was coded separately, such as 'software – architecture', 'software – graphics editor', 'software – spreadsheets'. For each skill, the number of times the skill was mentioned and the number of respondents who mentioned it were recorded. These specific skills for each of the phases (i.e. pre-crowdwork and during crowdwork) were then grouped into higher level skill categories – such as 'technical/core skills', 'communication skills', and 'learning to learn skills' – by a third researcher. Instances where there was a disagreement or lack of clarity about the low-level codes were discussed by the three researchers and refined or recoded as a result.

Developing a typology of learning practices

To address RQ2, we developed a typology of learning practices in crowdwork (section 7.3). We scoped crowdworkers' learning practices by using the Workplace Learning in Crowdwork Questionnaire (WLCQ) as our base instrument. The original version of the questionnaire – prior to the modifications that have taken place as part of the CrowdLearn project – was developed as part of the 'Learning in Crowdwork' project (2016-2018, funded by Alexander von Humboldt Foundation), led by CrowdLearn project member Anoush Margaryan.

The WLCQ instrument is adapted from three published and validated questionnaires that were originally developed to measure learning practices within conventional knowledge work occupations: the Self-Regulated Learning at Work Questionnaire (SRLWQ) (Fontana, Milligan, Littlejohn and Margaryan, 2015), the Classification Structure for Knowledge-Intensive Processes (Margaryan, Milligan and Littlejohn, 2011), and the Work Design Questionnaire (Morgeson and Humphrey, 2006). WLCQ has been recently trialled across two crowdwork platforms (Upwork and CrowdFlower) as part of the 'Learning in Crowdwork' project (Margaryan, 2016; Margaryan, 2019a & 2019b), where it has been further refined.

We developed a draft typology based on the WLCQ instrument to be used as a lens with which to understand the crowdworker interviews. The typology is largely conceptual, in that it is based on theoretical models and typologies derived from the workplace learning and educational psychology literatures (e.g. Fontana et al., 2015; Littlejohn, Hood, Milligan, & Mustain, 2016; Littlejohn, Milligan, Fontana, & Margaryan, 2016; Milligan & Littlejohn, 2014; Milligan & Littlejohn, 2016). Data from the crowdworker interviews were examined using this typology in order to identify any novel (i.e. previously unidentified) learning practices.

Examining the perception and use of skills development resources and skills matching

To address RQ4a, we conducted a second round of analysis of interview data which had previously been coded as “Ways of learning during freelancing”, “Why they learn”, and “What would they change”. These coded excerpts were further coded for 1) crowdworkers’ perception of these resources, and 2) crowdworkers’ actual use of these resources. A list of use cases was developed, identifying when and why crowdworkers did or did not use particular skills development resources.

To address RQ4b, crowdworker interview excerpts which had been coded as “Skills matching” or “What would they change” were thematically re-analysed for examples of 1) how platforms match the skills of crowdworkers to the (purported) needs of clients, 2) crowdworkers’ perceptions of the effectiveness of these various skills matching methods, and 3) how crowdworkers manipulate these mechanisms in order to increase success rate of being hired for well-paying, relevant work with reasonable clients.

7.1.2 Stakeholder interview methodology

In addition to interviewing crowdworkers themselves, we also interviewed representatives of other stakeholder groups. The purpose of these interviews was to provide a wider view of the field, and in particular to yield insights on the role of different organizations and policies in skill development and skills matching in crowdwork, addressing RQs 4-6.

Sampling and recruitment

Recruitment efforts were aimed at gaining research participants from a wide range of organisations and viewpoints, including from crowdwork platform companies, clients of crowdwork platforms, trade unions, professional bodies for the self-employed, policy experts and researchers, and stakeholders involved in initiatives concerning validation of informal learning and skills. To identify suitable stakeholder organizations within these categories, and individuals representing these organizations, we used our existing networks and advice from Cedefop. We also looked for exemplar individuals and organizations within the scholarly and policy literature, and at related conferences. Snowball sampling was also used to access more potential participants.

A particular challenge was identifying stakeholders who held specific views or expertise at the intersection of platforms, crowdwork, and skills. Many stakeholder representatives were interested in this topic area and were keen to follow the policy discussion, but simultaneously lacked the confidence to strongly express their own views on it. This diminished our potential pool of interviewees and is also notable as it suggests that there is demand for more information and analysis in this area, and a lack of supply.

We ultimately identified a long list of 49 potential stakeholder representatives, of which we successfully interviewed 25 representatives of 23 different organizations. A further 24 potential

participants were contacted but could not be reached or declined to take part in the study. The types of stakeholders represented by the successful sample are outlined in Table 10.

Table 10 ***Types of stakeholder organizations represented in the sample***

Type of stakeholder	Organizations represented
Crowdwork platform companies	5
Large clients of crowdwork platforms	1
Policy experts and researchers	6
Unions	5
Freelancer professional associations	1
Government agencies	5

Since nationality is one axis of difference in our research questions, we aimed for a trans-European interview cohort. Our sample included participants with special expertise in the following national contexts: Belgium, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden, and the UK, as well as the US. However, the primary selection criterion was each stakeholder's level of knowledge and expertise relative to labour platforms. This usually meant that participants had a pan-European perspective with specific knowledge of their country of origin and work location. As a result, it was difficult to cover European countries that are relatively underrepresented in policy circles, such as CrowdLearn target country Romania.

Semi-structured telephone and video conferencing interviews

The interviews were semi-structured and conducted via telephone or video conferencing. We did not always know in advance what the participant knew about the relationship between skills and crowdwork, so we allowed for a flexible approach within which we could explore unexpected lines of enquiry. Our target time for each interview was an hour; however, in some cases where the participant had an in-depth knowledge of the field the interview continued for up to 90 minutes.

Data and analysis

Audio recordings from the interviews were transcribed. To produce insights for this report, a member of the research team read through the transcripts and noted information that addresses the research questions or offered other potentially relevant insights. The findings were then cross-checked with findings from the crowdworker interviews and, where necessary, supplemented with additional desk research. In particular, to better understand the various mechanisms through which platforms facilitate skills development and skills matching, we manually inspected the features offered by the platforms. The overall findings were then summarized into the narratives presented in this report.

7.1.2. Crowdworker survey methodology

In the second phase of the research project, we collected data on the learning practices and skill development of 1,001 crowdworkers through the means of an online survey. Our instrument was distributed online, using Qualtrics, a leading professional online survey tool. The long version of the instrument took roughly 25 minutes to complete. Participants were compensated either 9.50 USD, 8.50 EUR or 7 – 7.50 GBP for their efforts depending on their online store preference, exchange rates and platform fees.

Survey instrument

We scoped crowdworkers' learning practices by using the Workplace Learning in Crowdwork Questionnaire, WLCQ, as our base instrument. The original version of the questionnaire, prior to the modifications that were undertaken as part of the CrowdLearn project, was developed during the 'Learning in Crowdwork' project (2016-2018, funded by Alexander von Humboldt Foundation) led by our Senior Expert, Anoush Margaryan. An illustrative, not platform-specific example of our survey instrument can be tested online (https://oii.qualtrics.com/jfe/form/SV_6i1dJ2H1hVf9bP7). It was originally adapted from three published and validated questionnaires that were developed to measure learning practices within conventional knowledge work occupations: the Self-Regulated Learning at Work Questionnaire, SRLWQ (Fontana et al, 2015), the Classification Structure for Knowledge-Intensive Processes (Margaryan, Milligan and Littlejohn, 2011) and the Work Design Questionnaire (Morgeson and Humphrey, 2006).

Our adapted survey instrument begins with an introductory section including two questions to check eligibility, background information on the CrowdLearn research project including a short video introducing the research team and a consent page. In the first section, participants are asked about the nature of their crowdwork tasks using scales from Margaryan et al (2011) and Morgenson et al (2006), the project categories in which they accept most projects and the skills developed prior and during crowdwork which are necessary to complete their work. In the second and third sections, participants are required to elaborate on their workplace learning activities and strategies respectively, measured on a 4-point Likert scale. Learning activities are based on a typology originally introduced by Fontana et al (2015) that captures individual and collective, as well as formal and informal dimensions of learning. Learning strategies are understood in form of the behavioural and metacognitive self-regulated learning (SRL) strategies which workers undertake to complete their tasks. Our items were derived from Zimmerman's (2005) 3-Phase Model of Self-regulated Learning that divides strategies in phases of planning, implementation and reflection. A popular model in educational psychology literature, it has been introduced to the analysis of self-regulated learning in the workplace learning literature in recent years (Margaryan et al, 2013; Milligan et al, 2015; Littlejohn et al, 2016). In the fourth section of the report, we included additional questions on communication between workers, platforms and the national government, specifically concerning efforts of

organized labour. In the final section of the questionnaire, we record crowdworkers' demographic information and motivations for learning.

The most notable adaptations we made to the WLCQ base survey instrument was the inclusion of our newly induced skills typology. In our instrument, respondents are asked to select and rank all those skill categories that are useful for crowdwork, differentiating between skills learned before and after joining the platform. We additionally collect crowdwork-specific data such as the job categories in which the respondents accept most of their projects and respondents' usage of skill tests offered by platform providers. The second and third section were adjusted to include additional answer statements, for instance on skill certification and learning in online community forums. The fourth section is an entirely new addition altogether. In the last section, we simply added to the amount of personal information collected from survey participants to include potential sources of stratification and inequality such as nationality at birth, the number of dependents, social class as well as cultural and social capital, but also participants' dependence on crowdwork and their affinity to platform work more generally. All adjustments reflected input from peers or were activities mentioned by interviewees during the qualitative phase of the project.

The distributed survey instrument was largely identical across platforms. The only differences were based on platform-specific names, jargon and context. We decided to shorten the fourth section on crowdworkers' interactions with fellow freelancers and other stakeholders for those surveys that were distributed with the assistance of platform providers. Since some questions in this section went beyond the immediate scope of skill development and learning, it was easier to communicate and secure assistance this way. To prevent biased responses, these questions were placed at the end of section 4, only followed by socio-demographic questions. For surveys that were distributed anonymously rather than through a personalized link, we added opportunities for respondents to pick their preferred means of compensation and to provide contact details to receive a copy of the final report or a gift card.

Sampling and recruitment

In total, we received 1,001 valid responses after reaching out to a minimum of ~3,500 and a maximum of ~7,500 crowdworkers[12]. Across platforms and sampling methods, our average response rate lies somewhere between 14 and 28%. The collected sample offers perspectives from workers that vary along important dimensions such as field of work, age, education and work experience. Adding to the overview provided in Figure 1, we further summarize some sample statistics in Figure 30 and Figure 31.

[12] Since we used platform-assisted sampling for parts of our sample and response rates are a sensitive piece of information to platform providers, we only have sufficient information to offer an estimated range of our initial sampling numbers.

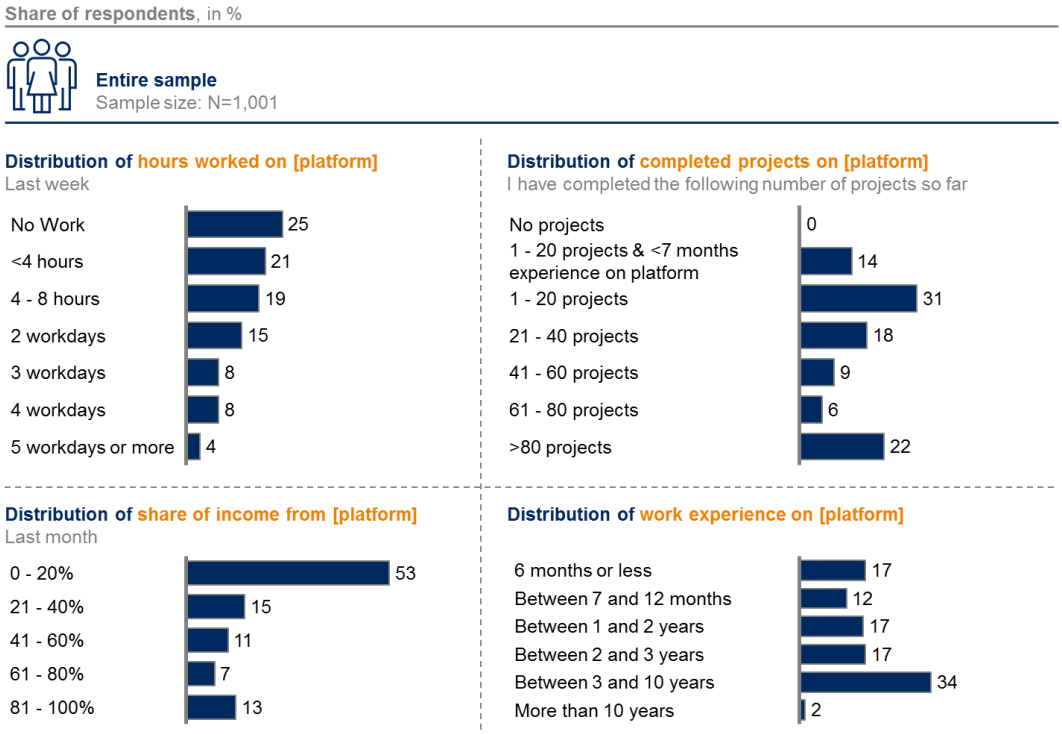

Figure 30: Sample characteristics of the crowdworker survey.

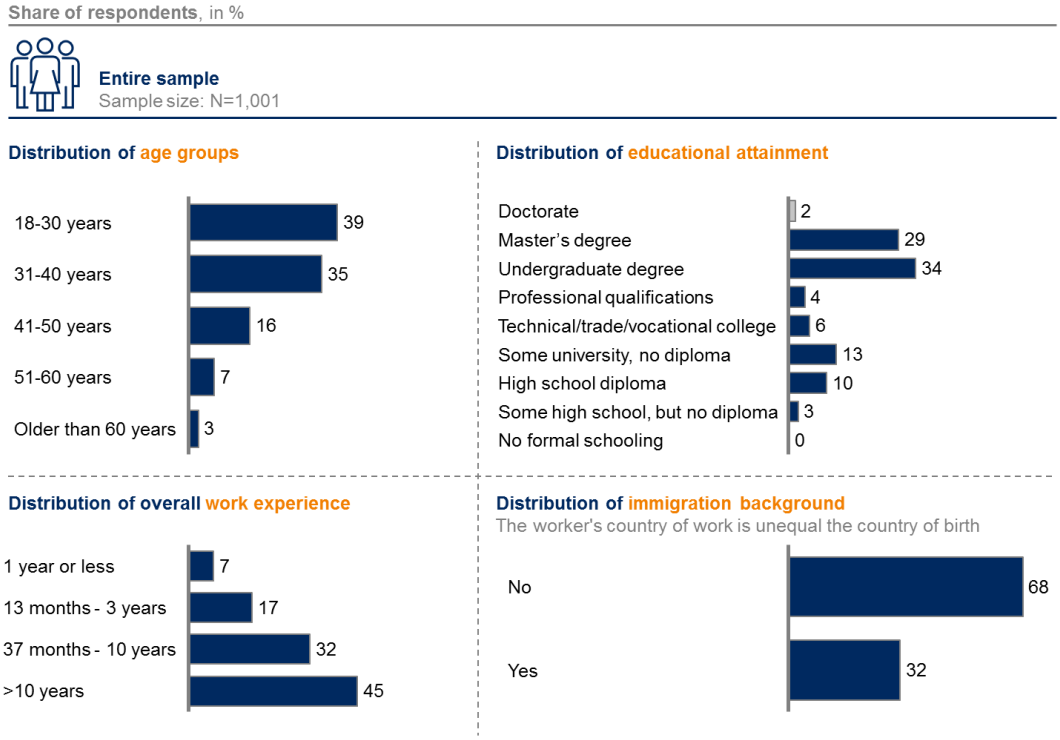

Figure 31: Sample characteristics of the crowdworker survey (2).

The majority of our sample includes workers from three major online labour platforms, Upwork, Fiverr, and PeoplePerHour. Some additional responses were collected from Twago. To be considered an eligible respondent, a person had to work from one of six EU target countries (Finland, Germany, Italy, Spain, Romania or the UK), be at least 18 years old and have work experience on the platform in question. The selection of countries was based on archetypes to adequately represent different geographical regions of the EU and to be representative of different economic and welfare regimes across the region. The different economic regimes pose differential barriers and enablers to workplace learning and skill development, as shown in the adult learning literature. The platforms were selected based on our choices in the interview phase in the first part of the research project.

We relied on three sampling methods: platform-assisted probability sampling, equal quota sampling, and snowball sampling.

Roughly half of our sample was collected using snowballing and equal quota sampling. For this subsection of our sample, we randomly identified crowdworkers while ensuring equal quotas for country of work and gender. As expected, the sub-sample achieved through equal quota sampling and snowballing is balanced for both variables. Each of the 6 countries as work locations makes up between 16 to 18% of the sub-sample. Slightly more than half (51%) of the sample are female. Ultimately, the equal quotas used are helpful because they allow us to compare sub-populations, like country of work, that are of interest for policy, for instance for national policy makers. We decided against our original intention of keeping quotas equal for project categories. For equal quota sampling, response rates ranged between <5% and >50% depending on the platform. The difference in response rates could be due to varying degrees of platform activity, different asking prices for survey participation, but also the technological design of the platforms. On Upwork, for instance, we were able to approach crowdworkers directly and individually by committing the compensation for their time and effort in an escrow fund for a set number of days in combination with an introductory message. While this approach was time consuming, it also allowed a detailed description of our project and a direct exchange with the freelancer, for instance to alleviate concerns about data privacy. In sum, we reached out to ~2,650 freelancers to record 523 valid responses. Thus, our average response rate for equal-quota sapling was 20%. In addition, we asked crowdworkers who supported us in the qualitative research phase to participate and share the survey amongst their colleagues. We contacted 38 workers which yielded another 13 responses. The average response rate for this approach was 34% at best, i.e. if no additional crowdworkers were invited. Snowballing via LinkedIn and online community forums did not prove to be a successful means of securing additional respondents in our case.

The other half of our sample was collected with assistance from two platforms, Fiverr and PeoplePerHour. The platforms supported us by distributing a project description and an anonymous survey link within a sample of crowdworkers. One platform assisted by drawing a random sample of workers. The other randomly selected workers while keeping country quotas constant. The latter approach only worked up to a point, since especially the number of Finish workers active on the platform was limited. The decision to switch from random sampling to

random selection with equal country quotas was again made to ensure sufficient sample variation to allow for comparisons of different types of freelancers.

Conceptual, methodological and ethical challenges

Ethically, in addition to standard considerations for research involving human respondents in line with our institutions research ethics standards, we explicitly focused on the collection of informed consent, securing data protection and the prevention of worker exploitation.
All respondents granted their written consent before participating in the survey. An informed consent page explained all details of our project that were not explained in our introductory video or the project description page beforehand. As needed, we provided a contact person for additional queries. Some participants made use of that offer and we responded to their queries in a timely manner.

Throughout the entire data collection period, we ensured that regulations specified by the EU Data Protection regulations, CEDEFOP and the lead institution, the University of Oxford, were adhered to. We treated the data as personal and stored it in Oxford Internet Institute's compliant internal cloud storage system. Access was provided only to the project team and the data was anonymized before its further analysis or distribution to the funding organization. While we did receive some criticism for the low financial incentives of our survey, our payments were above the minimum wage in the UK and most freelancers were motivated to participate beyond financial payments. That said, almost all workers accepted some form of payment, either in form of in-platform payments or Amazon gift cards.

One ethical concern that we underestimated before the survey roll-out were reputational risks. Various freelancers with high average wages and specialist portfolios declined our project offer or did not want it to appear on their profile. They were fearful of risking their reputation as a specialist or high-paid (and thus skilled) freelancer. For future research, it is worth considering such reputational punishment of workers not only by clients, but also the search algorithms on the platforms.

Conceptually and methodologically, there were five key issues to be considered in this part of the project: the unknown crowdwork population, potential self-selection bias while sampling, workplace learning as an elusive research topic, data quality at risk and the integration of qualitative and quantitative findings.

We addressed the unknown nature of the crowdworking population as rigorously as possible by drawing random samples whenever we ensured platform assisted. For all remaining platforms, we resorted to some form of equal quota sampling to ensure a sample with as much variation in key dimensions as possible.

Second, despite our best efforts while sampling, self-selection bias remained an issue to be considerate of throughout the survey distribution. Self-selection is the biasing of the sample by collecting more contributions from freelancers that have a preference to complete research surveys (Betlehem 2010). Such workers may be more highly learning-oriented, introspective and reflective. Our experience suggests that our data set also suffers from these biases to

some extent. We observed instances, for instance, when survey participants voiced their interest in the topic, complimented our instrument in comparison to similar data collection efforts they had already participated in or indicated sympathy based on their own academic background. Furthermore, we noticed that higher paid workers were less likely to accept our project proposals. If we assume that higher paid individuals tend to be more skilled or at least present a certain type of freelancers, this sub-group might be underrepresented in our sample. To illustrate this point, we collected the average hourly wages noted on the freelancers' profiles on one of the platforms on which we approached the workers directly. The average hourly wage of all contacted workers was 32 USD, which is comparable to the average hourly labour costs in the European Union in 2018. Those workers who accepted our proposal demanded on average only 28 USD per hour, those who declined 35 USD. One explanation for this observation could be the higher opportunity cost of contributing to our research for better paid individuals in comparison to those with a lower average wage. Beyond mere financial opportunity costs, some better paid individuals cited reputational risk as reasons for declining our offer. Adding lower paid projects from outside their domain of expertise to their project history could signal low utilization. Similarly, some were concerned that it might lower the hourly wage displayed on their profile.

Third, workplace learning processes are often happening without workers being aware of them (Eraut, 2007). Given that our survey results indicate that crowdworkers prefer informal learning activities over formal ones, this issue is likely to be more prevalent in crowdwork. Attending a learning workshop is easier recollected as a learning activity than searching a coding solution in an online forum. To mitigate this issue, we reminded participants to have a broad concept of learning in mind and always prompted them to consider a concrete time frame.

Fourth, we ensured data quality by conducting a pilot before launching the survey, receiving feedback from workers, fellow researchers and platform providers alike, and by adapting well tested scales that have previously been applied to similar work contexts. In general, we received much encouraging feedback from freelancers about the clarity and structure of our instrument. A sign that these measures were successful.

Last, we ensured the integration of qualitative and quantitative findings in the preparation of writing the final report, for instance by explicitly making time to add quantitative results to be interpreted by and discussed with the qualitative research team. In the write-up of the final report, we use analytical tools such as narrative summaries, thematic analysis and cross-case analysis and complement them with the additionally generated quantitative findings from this survey (Dixon-Woods et al, 2005). This allows for a common interpretation and synthesis across all data sources and should enable us to conceptualize policy recommendations on a more macro level perspective.

Data and analysis

In total, we created seven Qualtrics versions of our survey instrument to accommodate several sampling techniques across the four platforms. We did not weight the variables as the underlying population of crowdworkers is unknown. Instead, we focused our efforts on increasing sample variation to allow comparisons of sub-groups that are interesting from the perspective of public policy. The data cleaning and statistical analysis was done using Alteryx and R, and whenever sufficient and more economical Microsoft Excel. Selected results are presented in this report.

7.2. Skills typology

7.2.1. Skills developed prior to engagement in crowdwork

Skill type/ subtype	Respondents	Mentions
Technical/core skills		**228**
Admin skills (data entry, etc)	3	3
Advertising	1	1
Architecture	1	1
Chemistry	2	5
Computer programming	9	13
Currency (Fortrex) trading	1	1
Data analytics	1	1
Cybersecurity	3	7
Data science	1	1
Database design	2	2
Design, apps	1	1
Design, physical objects	1	1
Engineering, automotive	1	1
Engineering, civil	2	5
Engineering, industrial-business logistics	3	4
Engineering, knowledge	2	2
Engineering, mechanical	1	2
Game design	1	1
Graphic design	4	7
Illustration	1	1
Marketing (as a core skill)	8	18
Mathematics	3	3
Music, composition	1	1
Music, DJing	1	1
Music, performance	1	1
Music, singing	1	2
Music, software	1	1
Photography	2	2
Psychology/counselling	1	1
Public relations	1	2
Researching info	5	6
Research, systematic literature review	1	1
SEO as a core skill	1	1
Consultancy	2	2

Skill type/ subtype	Respondents	Mentions
Securities trading, stock exchange	1	1
Using social media	4	5
Software, animation	1	1
Software, architecture	1	1
Software, GIS	3	7
Software, graphics editor	4	4
Software, non-specific	2	2
Software, spreadsheets	3	4
Software, transcription	1	1
Software, virtual reality	1	1
Software, word processing	1	1
Sound engineering	1	1
Statistics	1	1
Stenography	1	1
Storytelling	1	1
Sysadmin	1	1
Teaching	4	5
Acting	1	1
Transcription, audio	2	3
Transcription, handwriting	2	2
Transcription, medical	1	1
Translation (Dutch)	1	2
Translation (English)	7	8
Translation (French)	1	1
Translation (German)	4	4
Translation (Italian)	1	1
Translation (Japanese)	1	1
Translation (non-specific)	1	1
Translation (Portuguese)	1	1
Translation (Romanian)	1	1
Translation (Russian)	1	1
Translation (Spanish)	3	3
Translation (technical)	1	1
Translation (translation machines)	1	1
Translation (Ukrainian)	1	1
Typing	1	1
UX/UI	1	2
Video editing	5	8

Skill type/ subtype	Respondents	Mentions
Video filming	2	4
Video production	1	1
Voice acting, recording	1	1
Web development	5	6
Writing (academic)	3	3
Writing (blog)	1	2
Writing (business, e.g. proposals)	1	1
Writing (creative)	2	3
Writing (CVs-resumes)	1	1
Writing (journalism)	5	7
Writing (non-specific)	2	2
Writing (offline articles)	2	2
Writing (online articles)	3	4
Proofreading	6	6
Language skills		**61**
Language skills (Catalan)	1	1
Language skills (Dutch)	2	2
Language skills (English)	22	27
Language skills (French)	8	9
Language skills (German)	6	6
Language skills (Italian)	1	1
Language skills (Japanese)	1	1
Language skills (Latin)	1	1
Language skills (Portuguese)	1	1
Language skills (Romanian)	1	1
Language skills (Russian)	1	1
Language skills (Spanish)	6	8
Language skills (Tamil)	1	1
Language skills (Ukrainian)	1	1
Obtaining work on platform		**17**
Applying for work	4	4
Marketing, including online (as a soft skill)	3	4
Pricing own work	4	5
Using the platform (Fiverr and other)	2	3
Selling online (crafts)	1	1

Skill type/ subtype	Respondents	Mentions
Learning to learn	**1**	**1**
Communication skills		**51**
Communication skills	22	25
Handling cultural differences	1	2
Handling customers	15	16
Presentation skills	1	1
Team work	3	3
Public speaking	1	1
Speaking, performance	1	3
Personal dispositions/attributes		**18**
Confidence	4	4
Independence	6	6
Punctuality	2	2
Resilience	1	**1**
Risk tolerance	1	1
Discipline	4	4
Organisation skills		**8**
Project management	4	4
Time management	4	4
Analytical skills		**1**
Computer literacy		**7**

7.2.2. Skills developed during crowdwork

Skill type/ subtype	Respondents	Mentions
Technical/core skills		**265**
Chemistry	1	2
Architecture	1	1
Computer programming	10	28
Data analytics	1	1
Engineering	1	1
Engineering, automotive	1	1
Engineering, civil	1	2
Engineering, industrial-business logistics	1	1
Google AdWords	1	1
Graphic design	2	4
Marketing, as a core skill	5	26
Mathematics	1	1
Music, composition	1	1
Music, recording	1	2
Music, software	2	4
Photography	1	3
Psychology/counselling	1	1
Researching info	1	11
Research skills, systematic literature review	1	1
SEO (as a core skill)	2	10
Social media	3	5
Software, analysis	2	2
Software, audio-editing	1	1
Software, CAD	1	2
Software, data analytics	1	1
Software, design	2	
Software, GIS	1	16
Software, graphics editor	2	3
Software, non-specific	3	2
Software, spreadsheets	1	11
Software, specialist	1	1
Speaking (performance)	1	7
Statistics	1	1
Transcription, general	1	1

Skill type/ subtype	**Respondents**	**Mentions**
Translation, non-specific	3	6
Translation, Spanish	1	1
Translation, technical	3	5
Translation, machine	1	1
Video editing	3	10
Voice acting/performance	2	3
Voice acting/recording	2	7
Web development	1	1
Writing, academic	2	7
Writing, blogs	1	1
Writing, branding	1	1
Writing, content	7	40
Writing, creative	1	2
Writing, journalism	1	1
Writing, online articles	1	1
Writing, product reviews	1	1
Proofreading	3	16
Writing, technical	2	3
Teaching/tutoring	2	2
Language skills		**18**
English accents	1	1
English	3	8
German	3	6
Spanish	2	2
Swahili	1	1
Obtaining work on platform		**177**
Using the platform (Fiverr)	6	8
Using the platform (other)	4	10
Using the platform (Upwork)	8	9
Applying for work	13	27
Pitching	1	2
Pricing own work	28	60
Who to trust	9	10
Marketing, as a soft skill	13	24
SEO (as a soft skill)	4	4
Self-presentation	1	23

Skill type/ subtype	Respondents	Mentions
Setting up as a freelancer		**28**
Obtaining business permits	2	2
Taxes	14	22
Visas	4	4
Learning to learn	**7**	**39**
Communication skills		**112**
Communication	21	56
Handling customers	23	40
Handling cultural differences	8	11
Community-building offline	2	4
Team work	1	1
Personal dispositions/attributes		**89**
Confidence	9	32
Creativity	1	11
Empathy	1	2
Flexibility	2	7
Independence	1	1
Punctuality	1	2
Resilience	9	22
Working alone	1	3
Discipline	5	9
Organisation skills		**56**
Being organised	1	17
Project management	1	2
Time management	13	37

7.3. Typology of learning activities and strategies

7.3.1. Learning activities

1. Individual learning activities

- 1.1. Learning by doing
  - 1.1.1. working on tasks alone and reflecting on how well one did;
  - 1.1.2. learning through trial and error;
  - 1.1.3. performing new and challenging tasks
- 1.2. Self-study
  - 1.2.1. following new developments in the field
  - 1.2.2. reading up professional literature
  - 1.2.3. taking an online tutorial
- 1.3. Attending a classroom course/workshop
- 1.4. Attending an online course e.g. MOOC

2. Collaborative learning activities

- 2.1. Collaborating with others on tasks
- 2.2. Asking others for advice or feedback on own work/learning
- 2.3. Observing and replicating other people's strategies

3. Formal/organised learning activities

- 3.1. Attending courses/workshops or MOOCS

4. *Informal/on the job learning activities* (see 1 and 2 above)

7.3.2. Learning strategies

1. Planning strategies

1.1. Setting up own performance standards
1.2. Setting up long term goals
1.3. Setting up short term goals
1.4. Devising a learning plan
1.5. Developing strategy of how to go about learning
1.6. Identifying own learning gaps before starting a work task

2. Implementation/volition strategies

2.1. Regularly reviewing progress towards goals
2.2. Adapting goals
2.3. Adapting strategies
2.4. Adapting learning plans
2.5. Self-efficacy beliefs and strategies to foster these in oneself
2.6. Intrinsic motivational beliefs and strategies to foster these in oneself
2.7. Visualisation/imagery
2.8. Asking others for help
2.9. Collecting information from different and diverse sources rather than relying on one source
2.10. Blocking time for learning
2.11. Writing practices (diaries) or making notes/diagrams to support one's learning
2.12. Comparing new learning to own extant repertoire of knowledge and skills

3. Reflection strategies

3.1. Reflecting on whether there were better ways to do a task
3.2. Thinking about what was learned
3.3. Writing up lessons learned
3.4. Sharing lessons learned/new knowledge/skills with others
3.5. Reflecting on fit of crowdwork to other work
3.6. Reflecting on fit of crowdwork to bigger picture of professional Development
3.7. Self-evaluation strategies – comparing oneself to one's own previous performance; and to other people's performance/standard/expected performance