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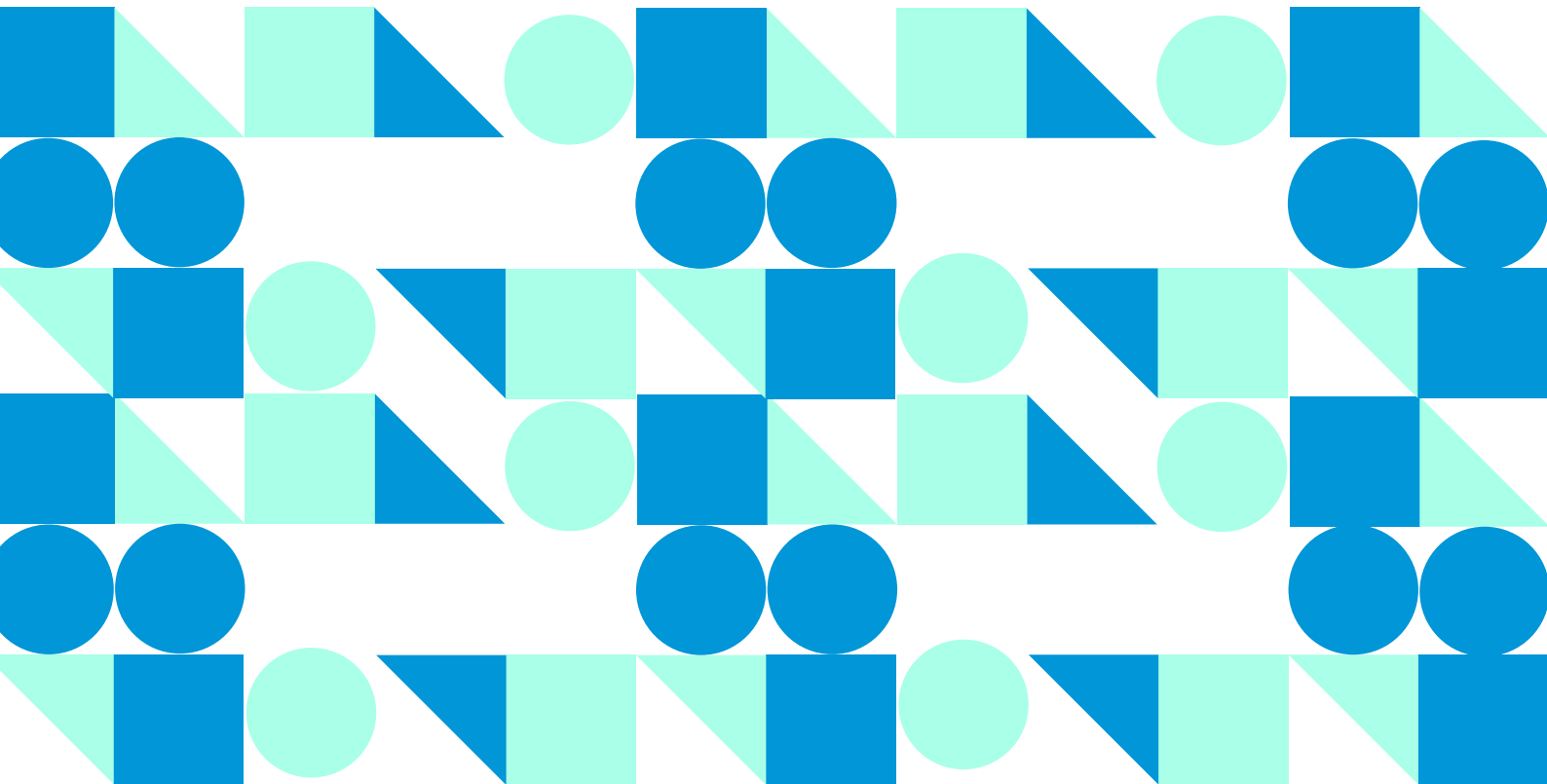
Research paper

Skill development in the platform economy

Comparing microwork and online freelancing



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The **European Centre for the Development of Vocational Training** (Cedefop) is the European Union's reference centre for vocational education and training, skills and qualifications. We provide information, research, analyses and evidence on vocational education and training, skills and qualifications for policy-making in the EU Member States.
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Foreword

Online work mediated by internet-based platforms is growing. The rise of the platform economy is driven by advances in digitalisation and a growing need for labour market flexibility. While many platform workers primarily engage in 'gig' work to overcome income constraints, some use it as an opportunity to develop new sources of income or new skills. Estimates suggest over one in 10 EU workers already engage in some crowdwork and labour market experts foresee that the platform business model will grow in the future. Gig work is often precarious and, where this is the case, the coronavirus crisis has accentuated the inherent problems. It should therefore not come as a surprise that platform work has become more prominent in the policy discourse about the future of work.

Research, analysis and discussion among policy-makers have rightly focused on the employment status of gig workers and working conditions, which are key social challenges that need to be considered alongside the opportunities the gig economy offers. Cedefop work on the platform economy mainly takes the perspective of skills formation and matching: identifying the typical skills that platform workers need to succeed and analysing the (algorithmic) matching channels and processes used by digital platform companies. Our 2017-19 *CrowdLearn* study clearly showed what sets platform work apart from traditional types of employment. It focused on online freelancers such as web and software developers, designers, writers and translators. This report presents the findings of the second *CrowdLearn* study, which was carried out during the first coronavirus pandemic wave in spring 2020. It specifically examines microwork, which entails the routine information classification activities that have been a driver of the artificial intelligence revolution. Comparing the skills and learning practices of microworkers with those of online freelancers is what makes this study a first of its kind internationally.

The Cedefop *CrowdLearn* project showcases the potential of online platform work for labour market integration, extra income and skills upgrading opportunities for workers who cannot find work or fully use their skills in their current employment setting. Promoting flexible forms of employment, particularly in the context of the economic fallout from the coronavirus pandemic, can be part of policies accompanying the transition to the future of work. But policy-makers must strike a balance between the economic opportunities of platform work and the social challenges it entails: the non-transferability of skills between different platforms and the wider labour market, (micro)credentials lacking validity, and the proliferation of training providers outside of the formal education and training

system. These issues come on top of other platform economy challenges such as labour market segmentation, skill underutilisation, high work pressure and low or erratic pay.

This report presents key issues, trends and challenges for skill development and learning in microwork. We hope the insights it provides can enrich the continuing consultation at European level and inform the process of shaping policies for a platform economy that balance economic and social aims.

Jürgen Siebel	Antonio Ranieri
Executive Director	Ad interim head of department for skills and labour market

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The Cedefop CrowdLearnMW study (NP/DSL/KPOUL/OnlineFLMWork /010/19) on which this report was based, was managed by Cedefop expert Konstantinos Pouliakas.

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Online platform work, where internet-based platforms bring together people from across the world to carry out tasks, has emerged in recent decades as a new form of employment. Estimates point out that about 1 in 10 EU workers have engaged in it, even though the share of those regularly depending on platform work for their income is considerably lower (Pesole et al., 2018). Driven by advances in digitalisation, a growing need for flexibility and efforts to overcome time and income constraints, the platform work business model is expected to grow in the future. The coronavirus crisis, however, has highlighted the vulnerability of gig work, making online platform work a major topic of concern in the policy and public discourse on the future of work.

Although crowdworking practices are diverse, two key types are microwork and online freelancing. In contrast to online freelancing (OF), which usually comprises more complex, high-skilled projects and activities (e.g. graphic, software and architectural design, data analytics, marketing services, legal advice), projects in microwork (MW) are outsourced to crowdwork platforms by clients and broken down into small units of work to be carried out for pay. Microtasks – such as image tagging, data entry, social media sentiment ratings, survey execution, and transcription – can typically be completed in seconds or minutes and require basic computer literacy. Such tasks are usually monitored by algorithms rather than humans, in an emergent mode of work supervision termed 'algorithmic management'. There has been a recent surge in the use of microwork in processing big data sets for training machine learning algorithms underpinning artificial intelligence (AI).

As a follow up to the CrowdLearn project carried out by Cedefop between 2017-20 (Cedefop, 2020), this study (CrowdLearnMW) undertakes a comparative analysis of skill development practices, workplace learning, job tasks and personal motives among these two main types of online platform work: online freelancing and microwork. To do so, a new survey of microworkers from a major platform, Amazon Mechanical Turk, has been carried out and jointly analysed with the original CrowdLearn survey of online freelancers (CrowdLearnOF).

The study particularly examines differences between microworkers and online freelancers in their workplace learning activities and self-regulatory learning strategies. It also considers key personal and environmental factors, particularly the perceived complexity and interdependence of their job tasks; the personal

motivations underpinning microworkers' and online freelancers' decisions to take up crowdwork; the intensity of engagement in crowdwork; and the degree to which they self-regulate their learning in their daily work on the platforms.

First of its kind internationally, this comparative study extends Cedefop's original CrowdLearn study to obtain additional insights and policy recommendations on how to foster workplace learning and skill development within both types of online work, widening the reach of the policy conclusions drawn.

The following summarises the main policy recommendations.

Microwork as a viable option for additional income

The majority of microworkers in our study suggested that they did not rely on microwork as a primary source of their income, with only 8.9% suggesting that earning primary income through microwork motivated them to undertake it. This contrasts with the 20.2% of online freelancers for whom earning primary income from crowdwork was a main motivating factor. The findings suggest that microwork can be a viable source of earning a secondary income for microworkers (40.7%) and online freelancers (43.7%). With 30.9% of the microworkers in the survey reported to be studying, compared to 13.2% of the online freelancer's sample, this highlights the potential of microwork in supplementing the income of young people.

Since there appears to be a continuous demand for online microwork (evidenced by the growing number of microtask crowdsourcing platforms in Europe), policy-makers could explore the opportunities presented by microwork to help increase (part-time or secondary) employment among citizens facing income, hours or other constraints.

Awareness campaigns to increase participation and engagement in microwork and policies aimed at building worker-centric platforms and fostering healthy relationships between all actors involved (clients/task requesters, microworkers, platform owners) are key possibilities to promote microwork as an opportunity to find more work, or supplement income. This could be part of the response to dealing with the economic fallout from the COVID-19 pandemic (Qiu; Gadiraju and Bozzon, 2020b; Sawyer et al., 2020; Tang, 2020). Policies could help furloughed workers across the continent earn additional income though online platforms.

Microwork can facilitate labour market integration

The CrowdLearnMW findings also showcase the potential of microwork in reintegrating marginalised population groups (for example, retired or disabled

individuals and the unemployed) into the labour market. Prior studies have highlighted the ambivalent implications of digital labour platforms for work and employment (Pesole et al., 2018). On one hand, they have the potential to lower the entry barriers to the labour market, facilitate work participation through effective matching mechanisms (Cedefop, 2020) and improve the working conditions of workers (for example, people with disabilities or health conditions, the young, older workers, unemployed individuals, people with a migrant background). This study shows many microworkers also enjoy their tasks. On the other hand, digital microwork platforms typically rely on a workforce of independent workers whose conditions of work, representation and social protection are often unclear and unfavourable.

The considerable uptake of microwork among immigrant workers needs the attention of policy-makers across the EU. The broadening landscape of crowd work in Europe over the last decade has coincided with an influx of migrants and refugees across EU Member States. Recent studies have found that over 30% of online workers in Europe are immigrants (Cedefop, 2020) and online work opportunities have provided migrants and refugees with viable means of earning a livelihood. The main challenges facing policy-makers are to optimise learning-related outcomes in online work and to help migrants integrate into the local population, such as promoting the sharing of online workspaces and building offline communities.

Drawing on a balanced assessment of the opportunities and challenges of crowdwork, policy-makers could consider initiatives to help engage vulnerable or marginalised groups in microwork platforms as a temporary measure to help facilitate labour market integration and skill development. In doing so, they can draw on examples and experiences from crowdwork platforms with a social mission such as Samasource which provide work opportunities to low-income workers in developing countries and, at the same time, offer the necessary digital skills training to engage in crowdwork.

Skill development: online freelancers vs microworkers

Microworkers (and online freelancers) develop most of their skills before their engagement in crowdwork, with the exception of specifically platform-related activities such as ‘being an online worker/[a freelancer]’ or ‘obtaining work on platforms’.

When asked about which skills microworkers had developed over the past three months, they most frequently reported developing ‘skills in obtaining work on

platform[s]' (61.1%), 'skills in being an online worker' ([1]) (60.1%) and 'analytical skills' (58.4%) as their top three categories. This can be explained by the time required for microworkers to develop the necessary skills to build a reputation, to understand how best to access a sufficient amount of good work, and to identify well-paying tasks and trustworthy clients with a view to maximising earnings.

Over the years, microwork has gained prominence due to the relatively simple nature of work that requires innate human intelligence (Surowiecki, 2005) (Surowiecki, 2005). Most tasks that microworkers engage with, therefore, do not require a special set of skills. This may explain why, in the case of microwork, how workers think about their work also reflects a surface-level engagement with tasks. 'Thinking deeply about my work' was prominently reported by online freelancers (73.2%), while only 49.7% of microworkers claimed to engage in this activity at least frequently. Similarly, online freelancers are more prone to self-reflection in comparison to microworkers. The share of online freelancers thinking frequently 'about how what I have learned impacts my work' (60.2%) is over 24 percentage points higher than is the case among microworkers.

76.3% of online freelancers reported frequently considering how their learning will be useful to them in 'future jobs', compared to 48.3% of microworkers. Almost the entire sample of online freelancers (94.9%) in the CrowdLearnOF study responded that they frequently 'try to understand the problem thoroughly', compared to 77.3% of microworkers. Similarly, online freelancers reported that they frequently 'apply lessons learned' from previous work (82.8%), whereas only 51.4% of their microworking peers did so. This could be due to the faster-paced and fragmented nature of microwork that, in comparison to online freelancing, may offer fewer opportunities to engage in self-reflection.

Promoting more creative and complex microwork

The CrowdLearnMW findings indicate that many microworkers perceive their tasks as repetitive and monotonous, corroborating evidence from prior work (Gadiraju and Dietze, 2017). In contrast, online freelancers' tasks appear to be relatively more complex and creative. However, research on microwork has shown microtask platforms can be suitable for both creative and complex work, via

([1]) The survey item was worded as 'Through work on [Platform], I developed skills in being a freelancer (e.g. how to get business permits, taxation, working alone, etc.)' for online freelancers and 'Through work on MTurk, I developed skills in being an online worker (e.g. how to earn a livelihood online, taxation, working alone, etc.)' for microworkers.

macrotask crowdsourcing (Doroudi et al., 2016 ; Haas et al., 2015; Valentine et al., 2017).

Macrotask crowdsourcing has been defined as innately linked with skill diversity, and more fine-grained skill types, including expert and 21st century skills, as well as valid skill identification and evaluation mechanisms (Lykourentzou et al., 2019). Examples of higher order cognitive and 21st century skills that workers might need to complete such tasks include: creativity, curiosity and imagination, critical thinking and problem-solving, effective oral and written communication skills, information analysis, agility, adaptability and the capacity to learn new knowledge fast, collaboration ability, communication skills, taking initiative, leadership and people management skills (Wagner, 2014).

The opportunity to develop such richer and specialised skill sets can be fostered by creating appropriate workflows and task designs to decompose and manage complex/creative work. For example, workers can develop writing skills through tasks that require creative generation of content. Task decomposition methods, however, should cater to optimising skill development rather than only for being consumable as a microtask. Typical task decomposition in microtask crowdsourcing workflows amounts to breaking down work into smaller units of non-complex activities, that do not particularly consider skill-augmentation of workers. Novel workflows and task decomposition methods that specifically focus on optimising skill development among workers are needed.

Policy-makers can support initiatives and platforms that build and promote support for complex and creative work to be executed in microwork marketplaces. This can be beneficial to microworkers, since creative and complex work has been shown to improve worker engagement and be mentally stimulating. Specifically, policy-makers can attempt to incentivise platforms to optimise for skill-augmentation of workers, so that the worker population can gradually upskill and become capable of taking on new types of tasks requiring those skills. This can, in turn, attract new clients who can turn to such platforms, creating the potential for a sustainable demand and supply of tasks. Although skilled and complex work is likely to warrant higher costs on microtasking platforms, clients on similar platforms have shown the inclination to reward high-quality work with commensurate pay (Hara et al., 2018).

Encouraging self-regulatory learning

Insight into the importance of self-regulatory learning (SRL) skills for microwork is a key contribution of the study. Workers need a baseline level of self-regulatory skills to plan, implement and evaluate their own learning and engage in skill

development that can enable them find better-paid and stimulating tasks, understand the complex and sometime opaque platform interfaces, workflows and rules, identify trustworthy clients, and generally succeed in platform work.

The study suggests that workers who are more self-regulated learners engage in more creative and complex tasks and more workplace learning. The importance of SRL skills was highlighted in the policy recommendations of the original CrowdLearnOF study of online freelancers (Cedefop, 2020) and it strongly applies to microwork as well. Therefore, education institutions, including vocational training institutions, should help people develop SRL skills. This can be achieved through designing educational and training experiences in such a way that the SRL behaviours are fostered and rewarded.

Bridging communication gaps in microwork

There is power asymmetry between workers and task requesters in microwork marketplaces (Irani and Silberman, 2013) and often issues arise due to lack of open and fluid communication channels (McInnis et al., 2016).

In this study it is found that face-to-face interaction with other online workers is slightly higher among microworkers, with 18.2% reporting at least weekly interactions, compared to only 16.5% of online freelancers. In contrast, communication via online channels is higher by seven percentage points in the online freelancer sample, due to a greater reliance on communication and less power asymmetry on most online freelance platforms.

The skills least frequently developed by microworkers are ‘communication skills’ (reported by 26.2% of the workers). This is likely the result of the autonomous and fragmented nature of microwork and the bare-bones communication features in platforms linking task requesters and workers. In contrast, most online freelancers (74.1%) reported frequently developing communication skills during the past three months. 39.9% of online freelancers reported frequently asking others for help ‘when having difficulty learning something’, compared to only 21% of microworkers. This signals that many microworkers cannot rely on peer networks if they need help in learning new skills.

The CrowdlearnMW findings corroborate this well-known characteristic of microwork marketplaces. The negative implications for learning should be a powerful incentive for platforms and policy-makers. Taking action to bridge the communication gaps between clients/task requesters and workers contributes to building a sustainable microwork labour market.

CHAPTER 1.

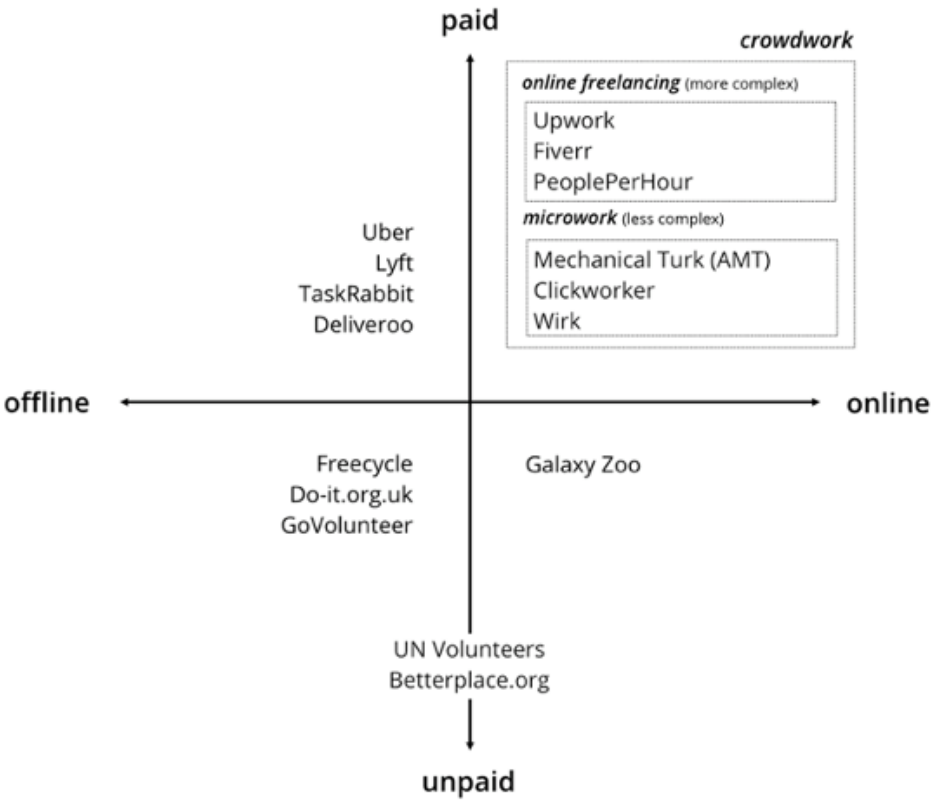
Introduction

1.1. Context and aims of the study

Online platform work has emerged over the last couple of decades as a form of crowdsourced work, whereby internet-based platforms are used to bring together people from across the world to carry out tasks (Lehdonvirta and Ernkvist, 2011). Crowdsourced work practices are heterogeneous, ranging from paid work to contest-based tasks, citizen science initiatives and volunteering (Schmidt, 2017). Some of these forms of work occur entirely online, within digital platforms or apps. Others are coordinated online, but the actual delivery of services occurs offline (Figure 1). The context of the present study is paid crowdsourced work where the delivery of service occurs entirely online (the upper right quadrant in Figure 1). We use the term crowdwork to characterise this form of platform work. Crowdwork occurs within internet-based platforms, which act as intermediaries between people or organisations who post tasks (clients or task requesters) and workers who perform them. Some of the largest and best-known examples of crowdwork platforms are Amazon Mechanical Turk (MTurk), People Per Hour and Upwork.

Shown in Figure 1, the two key types of crowdwork are microwork and online freelancing (Kuek et al., 2015). Microwork (MW) is a collective term for the form of crowdwork in which large projects outsourced to crowdwork platforms by clients are broken down – by the platform – into small units of work (called micro-tasks) and posted on the platform for crowdworkers to carry out for pay. Micro-tasks typically can be completed in seconds or minutes and are generally considered not to require any specialised skills beyond basic computer and internet literacy. Examples of micro-tasks are tagging images, rating public sentiment about a product on social media, finding or verifying information on the Web, writing short content, for example short product descriptions, or carrying out basic administrative tasks such as data entry. The distribution, completion and acceptance of microwork tasks are monitored largely by algorithms rather than humans, in an emergent mode of supervision of work termed ‘algorithmic management’ (Schmidt, 2017). Within microwork platforms, crowdworkers tend to be anonymous, distinguishable only by a set of numbers representing their worker ID.

Figure 1. **Types of crowdsourced labour**



Source: Adapted from (Margaryan, 2019b).

Compared to microwork, online freelancing (OF) tasks, sometimes called macrowork, tend to be larger, more complex and performed over longer periods of time: hours, days or months. Online freelancing often requires specialised, professional skills: graphic, software and architectural design; video production; data analytics; PR and marketing services; business plan development; or legal advice. In contrast to microwork platforms, OF platforms enable workers to publish their profiles, including their qualifications, work experience, skills and testimonials from previous clients. Further, OF platforms enable clients to select crowdworkers based on their skills and profile, and, unlike in microwork, the pay and other contractual terms are typically negotiated between the client and the worker. Within OF platforms, it is mainly task owners (clients) rather than algorithms that monitor the quality of work.

Both types of crowdwork have seen a rapid and steady increase in their uptake both in developing and developed countries, including within the EU (Lehdonvirta et al., 2019; Margaryan, 2019b). Online platform work occurs largely outside conventional organisational workplace settings, so crowdworkers typically

do not have opportunities to benefit from organisationally supported forms of learning, training and skill development. In recent years, some studies have examined how crowdworkers learn and develop skills in the context of their work on the platform (Cedefop, 2020; Margaryan, 2019a, 2019b); however, the focus has been largely on online freelancers rather than microworkers. Yet microwork represents a unique form of platform work that poses challenges and opportunities in terms of learning and skill development, warranting further research.

Since their inception over a decade ago, microwork platforms have tended to be largely used for processing large data sets related to digitisation of archives or marketing. However, recently there has been a surge in the use of microwork platforms to process large data sets for training machine learning algorithms underpinning artificial intelligence (AI) applications (Le Ludec; Tubaro and Casilli, 2019; Schmidt, 2019; Tubaro and Casilli, 2019). Microworkers engaged in these platforms are preparing, categorising and qualifying data for the AI applications, assessing the performance of these algorithms and making corrections where necessary. As microwork becomes increasingly central to the production of AI and machine learning algorithms, it is now quickly becoming a worldwide phenomenon that is not confined to developing countries as previously believed and observed. For instance, European workers are increasingly taking up microwork to train voice recognition software for regional European accents, including in affluent regions of Europe, or to train algorithms for self-driving cars for the automotive sector in Germany (Schmidt, 2019). Therefore, systematic evidence and insights into microworkers' learning practices could help inform EU policy-maker initiatives aimed at fostering learning and skill development in this emergent form of work.

Against this background, the aim of the CrowdLearnMW project is two-fold: to scope and analyse workplace learning and skill development practices of microworkers, along with their task characteristics and personal motivations for engaging in such work; and to compare microworkers' learning practices, job-task characteristics and personal motivations with those of online freelancers. In particular, the study identifies and analyses the similarities and differences between microworkers and online freelancers in terms of their key demographic characteristics; their perceptions of the nature of their work; their motivations for undertaking crowdwork; the skills they develop through crowdwork; and their use of workplace learning activities and self-regulatory learning strategies to plan, implement and reflect on their learning and skill development. The comparison could help in developing more nuanced insights into the demographics of these different types of platform workers, their distinct approaches to workplace learning and skill development, as well as on the potential interrelationships between the nature, organisation and design of different types of platform work.

The study underpinning this report is a follow up to the CrowdLearn project ([2]) implemented by Cedefop between 2017-20 to scope and analyse workplace learning, skill development and matching practices in online freelancing (Cedefop, 2020). As part of the original CrowdLearn project, a survey of 1 001 online freelancers (hereafter referred to as the CrowdLearnOF sample or study) working on four major crowdwork platforms was undertaken across five EU countries (including UK), representing the main types of welfare regimes in the EU and covering the north-south and west-east geographic divide (Cedefop, 2020). The follow up CrowdLearnMW study applies a modified version of the CrowdLearnOF questionnaire to examine workplace learning and skill development practices and related job tasks and personal motivations in a second major type of crowdwork, microwork. It includes 1004 microworkers from Amazon's Mechanical Turk platform based in a comparable set of five EU countries. The details of the methodology and the sample are further outlined in Section 2 of this report.

1.2. Research questions

The following key research questions (RQs) are examined in this study:

RQ1. What are the similarities and differences in the scope and frequency of use of workplace learning activities (WLAs) and self-regulated learning strategies (SRL strategies) between online freelancers (OFs) and microworkers (MWs)?

RQ2. What correlations are there, if any, between the complexity and interdependence of crowdwork tasks as perceived by the workers and the scope, frequency and nature of WLAs and SRL strategies workers undertake? What hypotheses could we formulate about the possible causes underpinning these potential correlations, to be explored in future research?

RQ3. What correlations are there, if any, between the differential primary motivations that lead individuals to undertake crowdwork and the scope, frequency and nature of WLAs and SRL strategies that the workers undertake? What hypotheses could we formulate about the causes underpinning these potential correlations, to be explored in future research?

([2]) *CrowdLearn* or *CrowdlearnOF* refers to the original Cedefop study focused on online freelancers whereas *CrowdLearnMW* refers to the subsequent study of microworkers.

RQ4. What correlations are there, if any, between the intensity of workers' engagement in crowdwork – as defined by the number of hours per week a worker spends carrying out crowdwork tasks – and the scope, frequency and nature of WLAs and SRL strategies that the workers undertake? What hypotheses could be formulated about the possible causes underpinning these potential correlations, to be explored in future research?

RQ5. What similarities and differences are there, if any, in the scope and frequency of use of WLAs and SRL strategies between microworkers and online freelancers who report low, medium and high levels of self-regulated learning behaviour?

CHAPTER 2.

Methodology and data collection

2.1. Survey design

To carry out the CrowdLearnMW study, the survey from the first CrowdLearnOF study was adapted to fit the context of microwork on the popular crowdsourcing platform, Amazon Mechanical Turk (MTurk), which has a relatively good representation of EU workers. The CrowdLearnMW survey comprised 28 questions, including a combination of open-ended, multiple-choice, and Likert-scale type questions. The estimated task completion time for the survey is around 10 to 15 minutes on average. Survey questions were adapted to reflect the context of microwork by referring to them as 'online workers' rather than 'freelancers'. Task categories were completely changed to reflect the types of tasks that are typically completed in microtask marketplaces (Gadiraju; Kawase and Dietze, 2014).

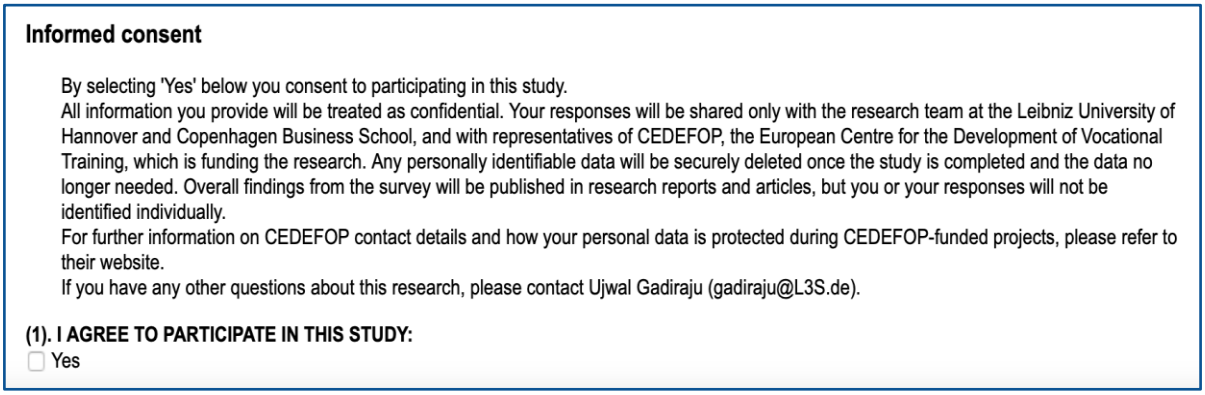
Prior research in microtask crowdsourcing and survey deployment has revealed the importance of task instructions in shaping the quality of responses (Gadiraju; Fetahu and Hube, 2016; Gadiraju; Yang and Bozzon, 2017; Han et al., 2019). Through clear instructions, recruited participants were informed that the survey pertained to their learning and professional development as part of their work on MTurk. They were informed that survey questions were about the work they carried out on the MTurk platform, the skills they develop through this work and their interactions with other workers and the platform. Participants were informed that it would be useful to think about a concrete task during which they had to learn new skills while responding to the questionnaire.

Learning can happen through means such as self-study, seeking feedback from the task requesters or their peers when applicable, solving problems, keeping up to date with developments in their field, or taking an online tutorial or attending a training workshop. Workers were requested to hold this broad view of learning in mind when considering their responses.

Finally, workers were reassured that there were no right or wrong responses to the questions in our survey. To avoid social desirability bias, workers were encouraged to report how they typically behave, rather than how they feel that they should behave. As a final note in the instructions, workers were assured of the privacy of their responses and that their individual data would not be shared with MTurk.

Before starting the survey, workers were first asked to indicate their informed consent (Figure 2). The survey was set up in such a way that respondents could not progress unless they formally consented to taking part in the study.

Figure 2. **Informed consent**



Source: Cedefop's CrowdLearnMW survey.

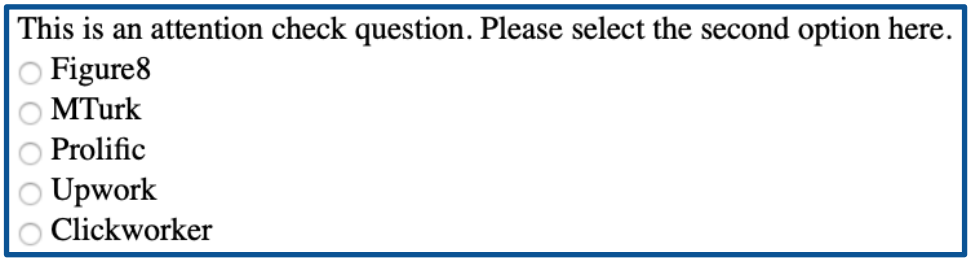
2.2. Method

To address the research questions listed in Section 1.2, the survey was deployed on the popular crowdwork platform, Amazon Mechanical Turk (MTurk). MTurk has been widely used over the last decade for a variety of applications requiring human input or intervention across several domains (Demartini et al., 2017; Gadiraju; Kawase and Dietze, 2014; Hube; Fetahu and Gadiraju, 2019; Zhang et al., 2019). A recent analysis of the population dynamics and demographics on MTurk revealed that there are over 100 000 active workers on the platform and there are over 2 000 active workers on the platform at any given time (Difallah; Filatova and Ipeirotis, 2018). Authors found that the half-life of workers on the platform is between 12 to 18 months and that the rate of departure of workers balances the rate of arrival of new workers, keeping the overall population of workers on the platform relatively stable. Most of the workers on the platform have been reported to be from the US (~75%), followed by India (~16%), Canada (~11%), Great Britain (~7%), Philippines (~3.5%) and Germany (~2.7%). Other European countries featured in the top 15 countries of origin for MTurk workers are Spain, France and Italy.

Considering that MTurk was one of the first microwork platforms to gain prominence, and due to its reasonable popularity in Europe, the survey was deployed on MTurk in March to May 2020, resulting in responses from workers in each of the following countries: Germany, Spain, France, Italy and

United Kingdom ([3]). To ensure the reliability of responses received, worker participation was restricted to those with an approval rating ([4]) of >80% using an inbuilt feature on the MTurk platform. In addition, two attention check questions were embedded in the survey to filter out unreliable workers in a post-hoc manner (Gadiraju et al., 2015). Figure 3 shows such an attention check question which explicitly asks the participant to select a given option.

Figure 3. **Example of attention check question embedded in the CrowdLearnMW survey**



Source: Cedefop's CrowdLearnMW survey.

The study aimed to collect responses from 270 unique MTurk workers from each of these countries. However, due to 'task stagnation', also referred to as 'HIT starvation' ([5]), and after filtering out unreliable workers (who responded incorrectly to at least one of the two attention check questions), the final data set includes responses from 248 unique MTurk workers from the UK, 232 workers from Germany, 259 workers from Italy, 267 workers from Spain and 84 workers from France. Overall, responses from 1 075 microworkers from five different countries were collected. Of these, 71 were discarded due to failing at least one of the two attention check questions or otherwise providing non-applicable answers, resulting in a final microwork data set of 1 004 respondents.

Respondents were rewarded with a monetary compensation of USD 1.80 for completing the 10 to 15-minute survey successfully. Payments were approved through the MTurk platform within two-three days of workers submitting their responses.

([3]) Note that Germany, Spain, Italy and the United Kingdom were also considered in the Crowdlearn survey; the CrowdLearMW study included France, as it is an EU country with reportedly high and growing incidence of microwork.

([4]) HIT approval ratings on MTurk reflect the proportion of tasks completed by workers that are accepted by task requesters.

([5]) HIT starvation is a phenomenon typical of MTurk, where batches of HITs tend to become less popular over time with fewer new workers completing them (Chilton et al., 2010).

CHAPTER 3.

Survey descriptive findings

In the following sections the key findings from the CrowdLearnMW survey, which surveyed microworkers, are presented, discussed and contrasted with the results of the original, CrowdLearnOF survey of online freelancers. Evidence of relationships or notable discrepancies between the two forms of crowdwork are then discussed in the next section.

3.1. Demographic characteristics

3.1.1. Age, gender and geography

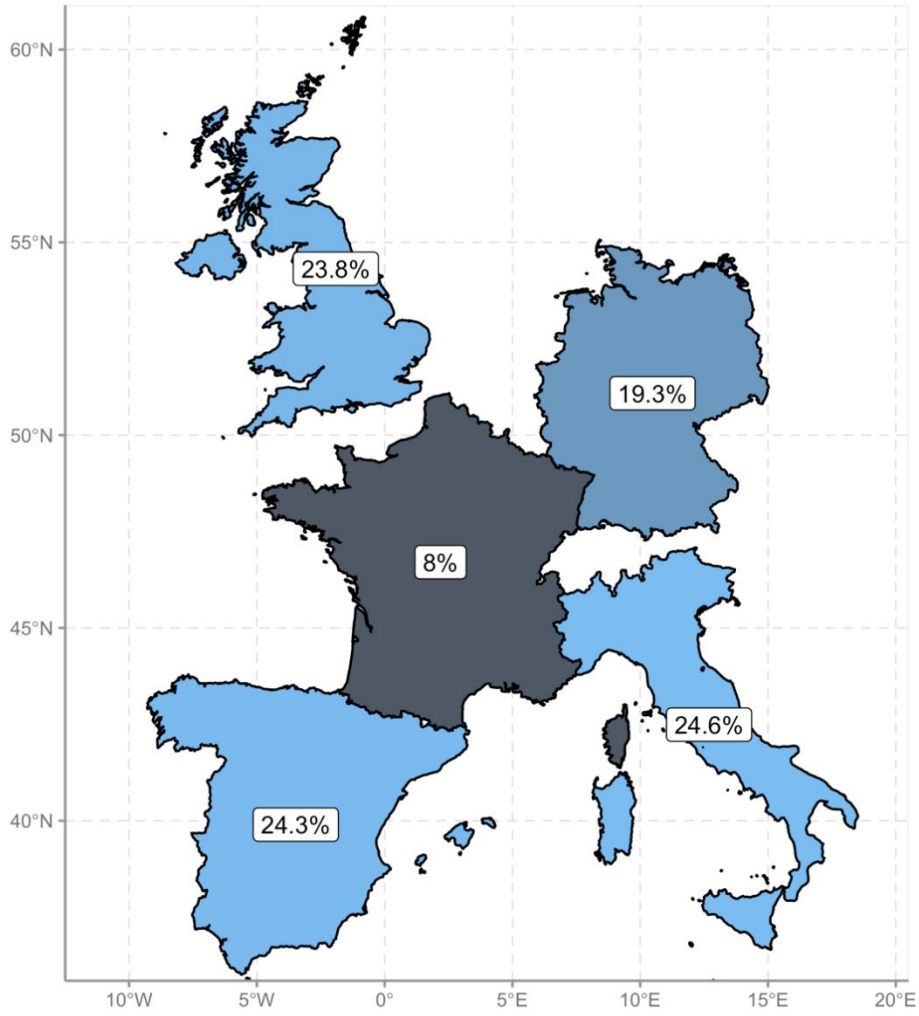
The majority of microworkers in the CrowdLearnMW sample reported working from Italy (24.6%), followed by Spain (24.3%), the UK (23.8%) and Germany (19.3%). A lower percentage of microworkers in the study were working from France (8.0%) (Figure 4).

69.6% of survey respondents identified themselves as ‘male’, 30.1% as ‘female’ and 0,3% (three respondents) as ‘other’. This skewed distribution with respect to gender is consistent with what has been previously reported on the Amazon MTurk platform (Difallah; Filatova and Ipeirotis, 2018). For the microwork sample, the average participant age was 31 years across all genders, with a standard deviation of nine years (Table 1).

By contrast, gender was more equally balanced among the original online freelancer sample, with 47% percent of respondents of the CrowdLearnOF sample being female, while the average age of participants was slightly higher at 35 years with a standard deviation of 11 years.

Immigration background, determined by comparing the respondent’s country of birth and the country they were currently working from, was reported by around one third of participants in both samples (31.7% among microworkers and 32.3% among online freelancers) in both surveys. Similar proportions of workers with immigrant background have been reported in other recent EU surveys of crowdworkers (Pesole et al., 2018). There is no statistically significant difference between the two samples in this aspect.

Figure 4. **Geographic distribution of CrowdLearnMW sample**



Source: Cedefop's CrowdLearnMW survey.

Table 1. **Age, gender and geographic distribution of microworkers**

	Total n=1,004	Female n=302	Male n=699	Other n=3
Age	31 (±9)	32 (±9)	30 (±9)	31 (±8)
Countries				
France	80	19 (23.8%)	61 (76.2%)	0 (0%)
Germany	194	44 (22.7%)	150 (77.3%)	0 (0%)
Italy	247	65 (26.3%)	182 (74.7%)	0 (0%)
Spain	244	91 (37.3%)	152 (62.3%)	1 (0.4%)
UK	236	82 (34.7%)	152 (64.4%)	2 (0.9%)

NB: Percentages (%) / standard deviations (±) in parentheses.
Source: Cedefop's CrowdLearnMW survey.

3.1.2. Educational background

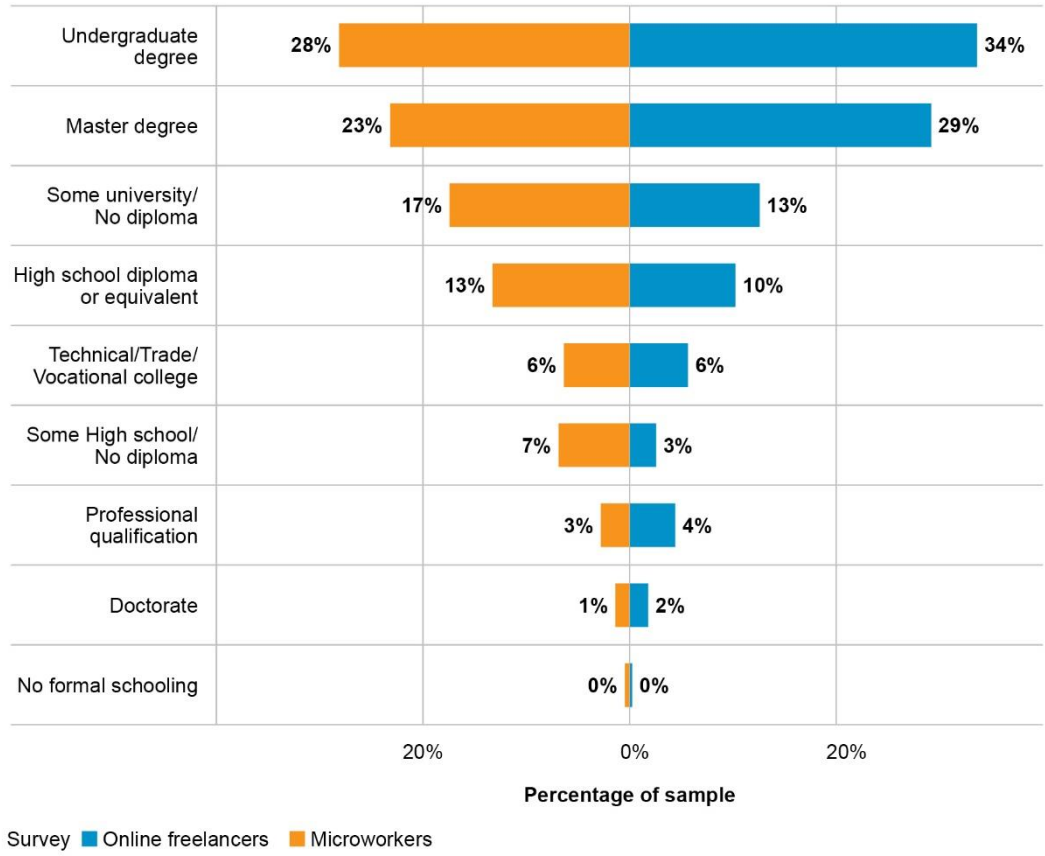
The level of educational attainment was similar in both samples, with most online freelancers (33.6%) and microworkers (28.1%) reporting having completed university education at the undergraduate level (Figure 5).

29.1% of online freelancers and 23.1% of microworkers reported holding a postgraduate (master level) qualification, with 1.8% and 1.4% respectively claiming to have obtained a doctorate. In combination, the level of respondents with an undergraduate or postgraduate university degree was 11.9 percentage points higher in the CrowdLearnOF (online freelancer) than in the CrowdLearnMW (microworker) sample. The rate of microworkers with leaving certificates from 'technical/trade/vocational college' was 6.4%, compared to 5.6% of online freelancers. Online freelancers hold other 'professional qualifications' (4.4%) at a slightly higher rate than microworkers (2.9%).

Age and educational attainment rates could indicate a more mature audience engaging in online freelancing activities (i.e. more complex crowdwork), while microworkers are less likely to have completed their formal education. This is potentially corroborated by the higher rates of microworkers claiming a 'high-school diploma or equivalent' (13.2% compared to 10.2%), 'some university' (17.4% compared to 12.6%) or 'some high school' (7% compared to 2.6%) as their highest level of educational attainment. The lead of microworkers over online freelancers in these categories could indicate that microworkers are more likely to remain in active education.

The above figures suggest that microworkers – despite performing what could be considered low-skill tasks – are not themselves necessarily low-skilled individuals. There are different reasons – such as different life course factors or motivational reasons – why skilled individuals may choose to engage in low-skill tasks; the nature of tasks should not be conflated with the nature of the skill profile of the workers. Future research is needed to surface and analyse such relevant life course factors and motivational rationalities that lead skilled/educated people to undertake low skill tasks (Margaryan and Hofmeister, 2012).

Figure 5. **Educational attainment of microworkers and online freelancers**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

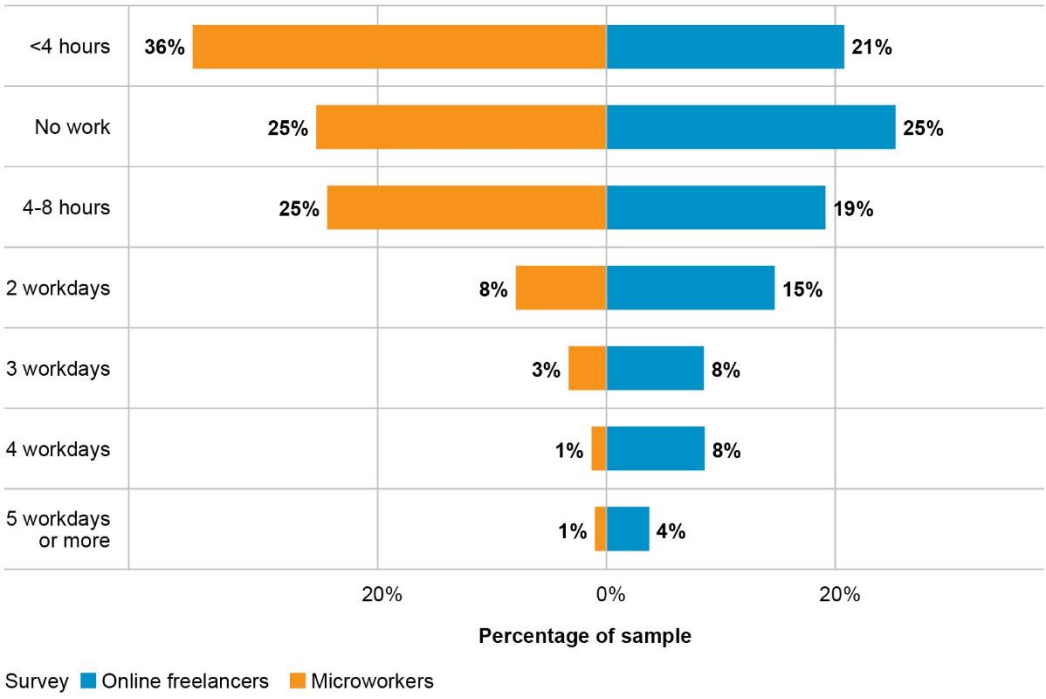
3.2. Work and labour supply characteristics

3.2.1. Intensity of engagement in crowdwork

Weekly commitment to platform-facilitated work (Figure 6) and self-reported main form of employment (aside from crowdwork) provide further insights into the differences between the two types of workforces.

Only 1.1% of microworkers and 3.4% of online freelancers said that they devoted a full five-day week to their crowdwork in the week preceding the survey. The number of respondents saying they worked a four-day week increases markedly to 8.5% among online freelancers but remains similarly low at less than 2% for microworkers. About 4% of microworkers worked the equivalent of three workdays, in contrast to 8% of online freelancers. 14.6% of online freelancers and 8% of microworkers engaged in crowdwork about two days a week.

Figure 6. **Hours worked on platforms in the past week**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

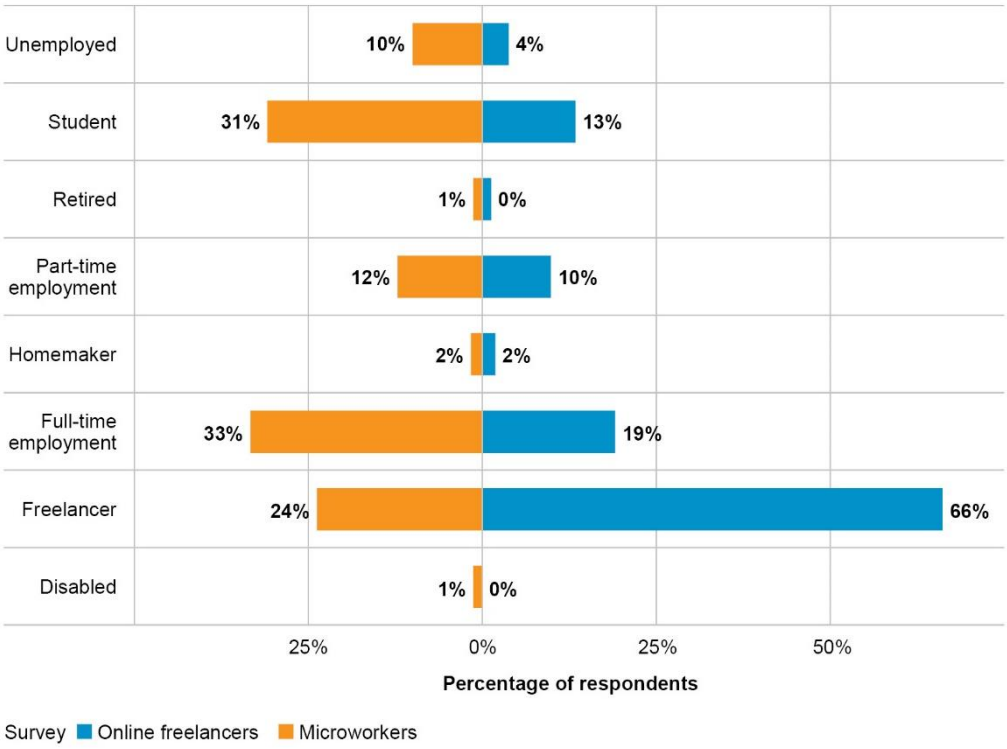
The number of microworkers engaging in crowdwork between half a day and a full day in the past week of the survey was considerably higher at 24.5% compared to 19% of online freelancers. The highest proportion of respondents – 20.7% of online freelancers and 36.2% of microworkers – did not engage in crowdwork for more than half a day (under four hours) in the specified period. Around a quarter of both samples, 25.2% of online freelancers and 25.5% of microworkers, claimed not to have undertaken crowdwork at all over the past week, potentially indicating difficulties in reliably obtaining this type of work.

Overall, the above data suggest that both types of crowdwork are undertaken primarily as a secondary or part-time form of work on behalf of individuals engaging in the online gig economy.

3.2.2. Main employment status

Participants were asked to report their current primary employment status in a 'check all options that apply' question as detailed in Q18 of the questionnaire. The comparative responses across both types of crowdwork are summarised in Figure 7.

Figure 7. **Main employment status of microworkers and online freelancers**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

Since more than one option could be selected (e.g. 'freelancer' and 'student'), each response category represents an individual poll. The results exhibited significant differences between the two groups of crowdworkers. Whereas 66% of online freelancers selected the option 'freelancer/self-employed', only 23.8% of microworkers reported this as their primary employment status. Inversely, while one third (33.4%) of microworkers reported being in a full-time employment arrangement, only 19% of online freelancers selected this option. Similarly, 30.9% of microworkers reported they were studying compared to only 13.2% of online freelancers.

All of this confirms the notion that microwork is primarily a supplementary work activity, while online freelancing, requiring more commitment and dedication, is more of a category for itself. This insight might be important in appropriate support to crowdworkers' skill development practices. Whereas online freelancers might be better served by improving their entrepreneurial and administrative skills, multi-job-holding microworkers might require improved analytical skills to complete tasks efficiently and substitute their incomes while in active employment or education.

Part-time employment was more closely aligned between the groups, with 12.3% of microworkers and 9.8% of online freelancers reporting it as their main

employment status. The percentage of unemployed online freelancers was very low at 3.6%, compared to 10.2% of microworkers. Despite receiving very few responses from either group, the remaining options, such as being 'disabled', 'retired' or a 'homemaker', were slightly higher in the microworkers' sample. Microworking could, therefore, potentially provide a means of labour market reintegration for such groups at a distance from traditional labour markets.

Participants were further given the option to specify 'other' employment categories not represented in the list. Across the samples, 29 participants provided such additional information (Figure 8). Self-describing as an 'entrepreneur' is a recurrent theme throughout the open responses for both types of crowdworker, potentially indicating that the term carries a different meaning in the context of crowdwork that is distinct from the available 'freelancer/self-employed' category option specifically provided in the questionnaire.

Figure 8. **'Other' employment responses**

Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

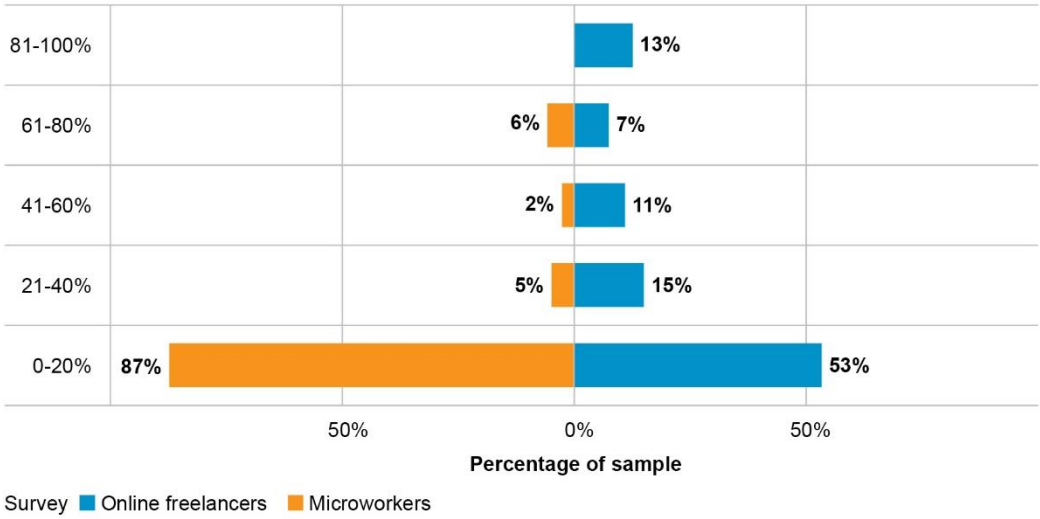
In the corresponding survey section, one third (33.2%) of microworkers identified as entrepreneurs, compared to 51.8% of online freelancers. It is not possible to know why this difference arises from the survey alone; further qualitative research is required to understand the reasons. One potential reason is

that this may be attributable to the different nature of the crowdwork performed, with higher levels of creative freedom in online freelancing platform work leading to an entrepreneurial self-image.

3.2.3. Income from crowdwork

One difference between the two types of crowdwork was evident in the proportion of respondents claiming to earn 81% or more of their monthly income through platforms, with 13% of online freelancers but no microworkers selecting this category (Figure 9).

Figure 9. **Share of income earned through platforms in the past month**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

In the case of microworkers, this is consistent with previous research findings that have showed a smaller fraction of them relying on platform marketplaces for their primary income (Barbosa and Chen, 2019; Gadiraju et al., 2017; Kaufmann; Schulze and Veit, 2011; Saito et al., 2019). The percentages of online freelancers reporting monthly incomes gained through crowdwork equivalent to 61-80%, 41-60%, or 21-40% of their total income were 1.7, 8.5 and 10.4 percentage points higher respectively than those of microworkers in the same categories. By contrast, the majority of microworkers (86.9%) saw themselves in the lowest available bracket of income earned through crowdwork in the past month at 0-20%, compared to 53.2% of online freelancers. A reason why microworkers may have relatively low self-reported incomes can be due to the experience required to earn high incomes on platforms such as Amazon's Mechanical Turk (Gadiraju et al., 2017; Han et al., 2020; Savage et al., 2020).

3.3. Motives and work satisfaction

3.3.1. Motivations to undertake crowdwork

The motivations for undertaking crowdwork ('Why do you work on [platform]?') were notably different between the two groups of crowdworkers (Figure 10).

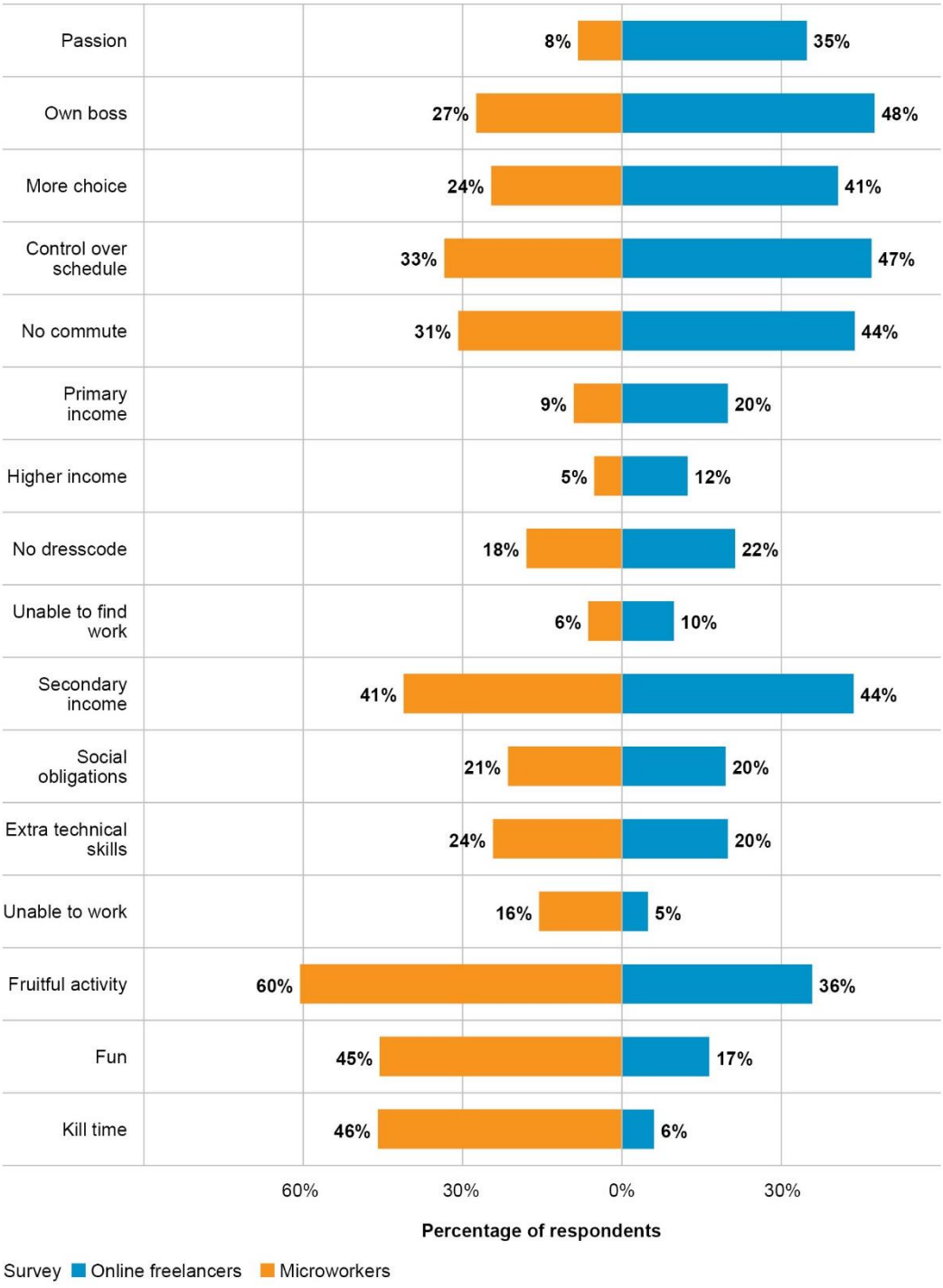
In the CrowdLearn questionnaires, participants were able to select multiple options. Among online freelancers, the main motivations for crowdworking were 'being my own boss' (47.7%), 'control over my schedule' (47,4%), 'no commute / working from anywhere' (44%) and having a 'secondary source of income' (43.7%). Microworkers predominantly claimed that their main reason for working in their crowdwork was a 'fruitful way to spend time and earn money' (60.2%), a way to 'kill time' (45.5%), a source of enjoyment (45.3%) and a 'secondary source of income' (40.7%). These findings may be explained by the earlier finding suggesting that microwork might be a supplementary/side activity with relatively low time and resource investment.

3.3.2. Enjoyment from crowdwork

Overall, the levels of enjoyment of crowdwork were similar across the two CrowdLearn samples. 22.8% of online freelancers claimed to 'always enjoy' their crowdwork compared to 16.1% of microworkers (Figure 11), indicating that fewer workers unconditionally enjoy their crowdwork when engaging in less complex microwork.

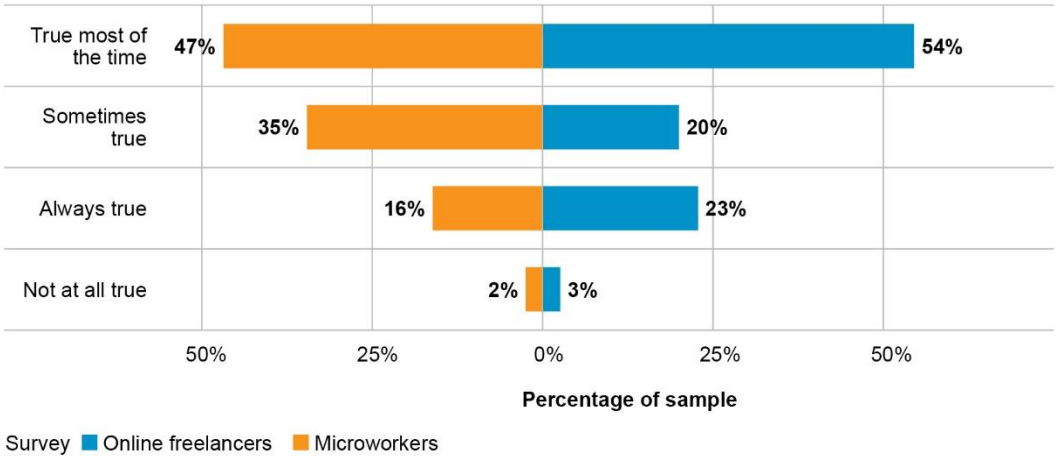
The largest percentage of respondents enjoyed their crowdwork 'most of the time', with 46.8% of microworkers and 54.4% of online freelancers choosing this option. Occasional enjoyment ('sometimes true') was higher among microworkers (34.6%) than online freelancers (20.1%). Only 2.5% of microworkers and 2.7% of online freelancers claimed not to enjoy their crowdwork at all. This is consistent with other studies that explored the self-reported moods of microworkers across different settings, showing that the majority of workers reported being in pleasant moods (Gadiraju and Demartini, 2019; Qiu; Gadiraju and Bozzon, 2020a; Xu; Zhou and Gadiraju, 2019; Zhuang and Gadiraju, 2019).

Figure 10. **Motivations for crowdwork**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

Figure 11. **Enjoyment from crowdwork**



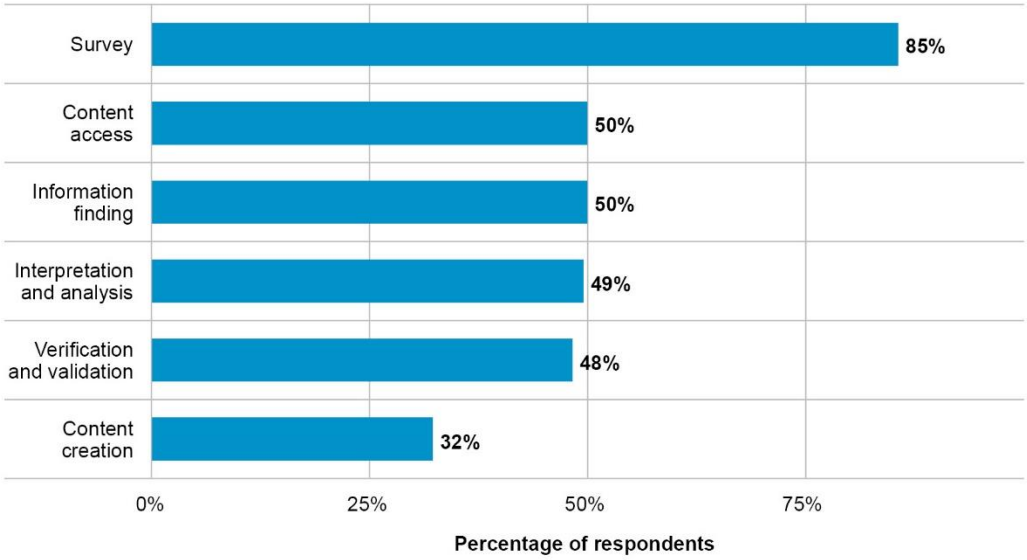
Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

3.4. Nature of work and platform tasks

3.4.1. Tasks in crowdwork

Asked about the nature of tasks they performed, most microworkers (85.3%) indicated surveys/questionnaires to be their top activity on the platform (Figure 12). Around half of respondents listed 'content access', defined as simple tasks requiring only access of content, e.g. a video, and no further interaction. The same proportion quoted 'information finding', defined as tasks involving basic research on specific topics (such as companies), interpretation and analysis tasks (such as categorisations), and verification and validation tasks, involving following instructions to confirm the validity of content. Content creation and other generative tasks were only reported as a microwork category by 32% of participants.

Figure 12. **Tasks carried out in microwork**



Source: Cedefop's CrowdLearnMW survey.

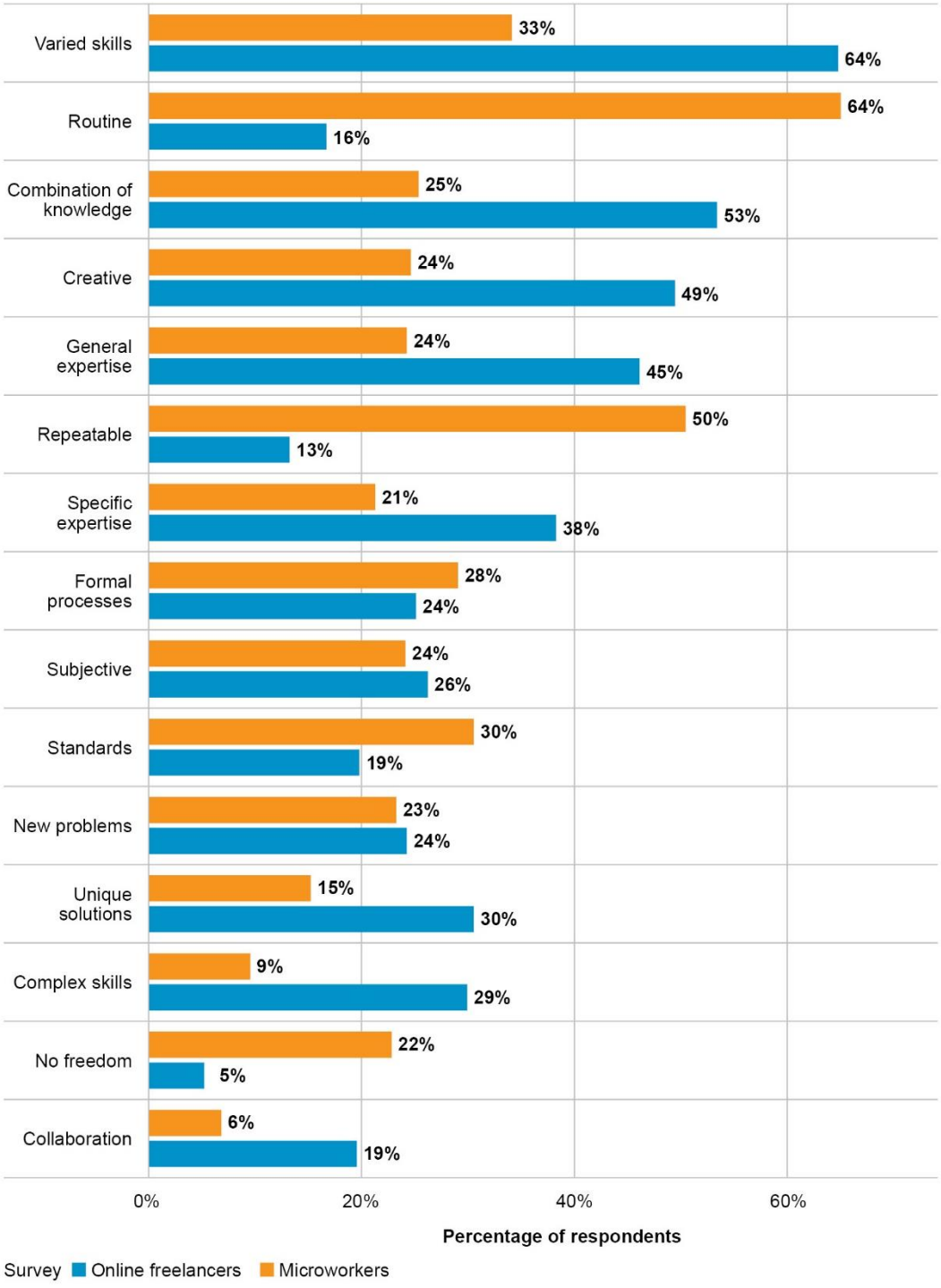
3.4.2. Work nature: task complexity and interdependence

In addition to scoping workers' primary task categories, the CrowdLearnMW study also analysed workers' perceptions of the nature of their crowdwork tasks, particularly the complexity and interdependence of the tasks and the skill variety and complexity required to complete them (Figure 13).

64.2% of microworkers described their tasks as 'routine' and 49.7% as 'repeatable'. Only 16.1% and 12.7% respectively of online freelancers responded in the same categories in the CrowdLearnOF survey. Online freelancers reported more complex work, with 64.2% claiming their crowdwork required 'varied skills', 52.8% listing 'combination of knowledge from various fields' and 49% highlighting the 'creative/improvisational' nature of their work. In comparison, only one third (33.5%) of microworkers thought their work required 'varied skills' and around one quarter (24.6%) thought their work required 'combination of knowledge from various fields' or was 'creative' (23.8%).

Other noteworthy differences included 19% of online freelancers reporting that their work involved 'collaboration', compared to only 6.4% of microworkers. Further, 22.1% of microworkers reported that their work did not offer them 'freedom to decide', compared to only 4.7% of online freelancers. These findings potentially point to some fundamental differences in the nature of work between microwork and online freelancing.

Figure 13. **Nature of tasks in crowdwork**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

3.4.3. Interpersonal communication

Overall, microworkers reported slightly more communication activities than did online freelancers (Figure 14), possibly due to the limited communication channels available on microwork platforms and the need to use external, non-platform communication as reported in previous studies (Yin et al., 2016).

32.8% of microworkers reported making use of external online forums at least once a week, compared to only 19.9% of online freelancers. Self-reported face-to-face interaction with other online workers was also slightly higher among microworkers, with 18.3% reporting at least weekly interactions, compared to only 16.6% of online freelancers. In contrast, communication via online channels was higher by 6.9 percentage points in the online freelancer sample. General communication (with friends and family) was reported by a large majority of both samples.

3.5. Skill development and workplace learning activities

This section addresses RQ1, concerning the nature and frequency of skill development (SDEV) and workplace learning activities (WLA), by examining their uptake in the sample of microworkers from the CrowdLearnMW sample and comparing the results with data collected from online freelancers (CrowdLearnOF).

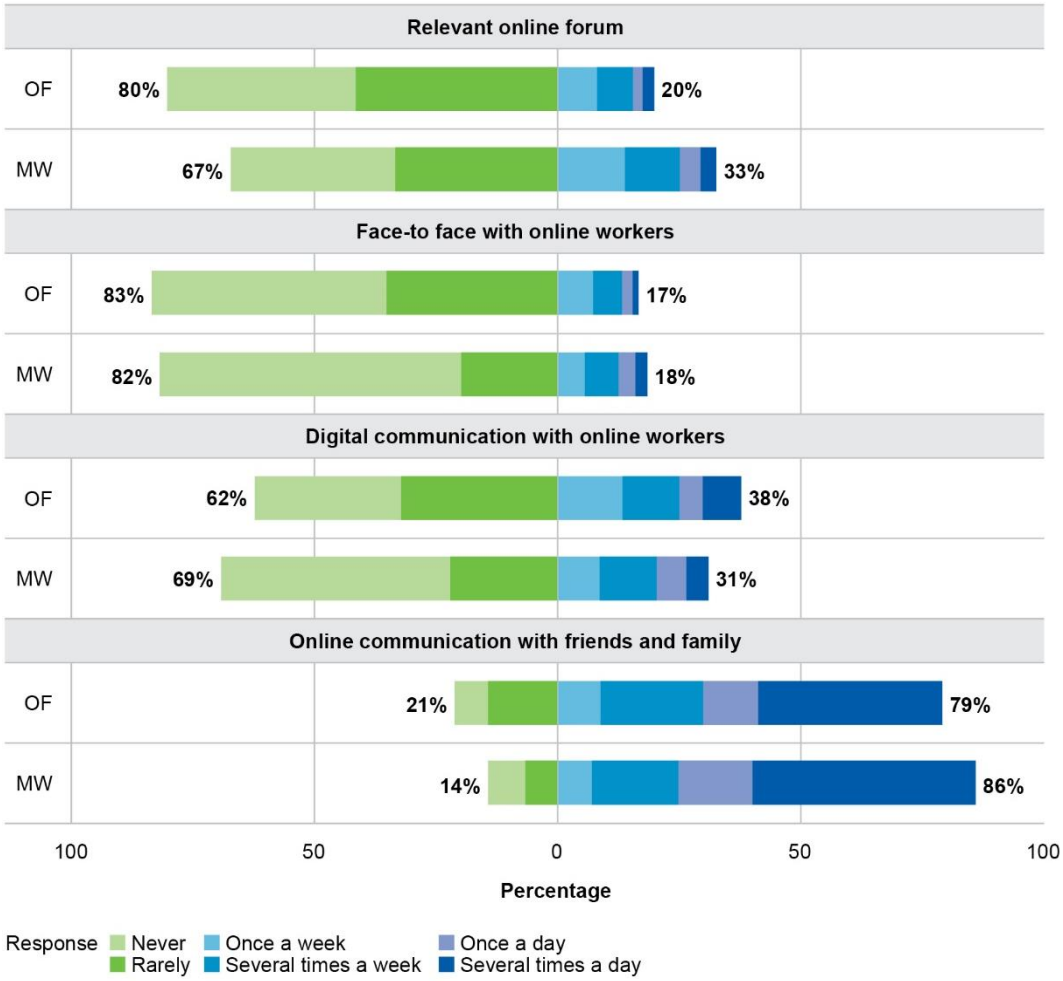
3.5.1. Skill development

Asked about which skills they had developed over the past three months, microworkers reported frequently developing ‘skills in obtaining work on platforms’ (61.1%), ‘skills in working online’ (60%) and ‘analytical skills’ (58.4%) as their top three options (Figure 15). This is consistent with recent research highlighting the difficulty and role of experience in finding well-paid and high-quality work on microtask marketplaces (Han et al., 2019; Savage et al., 2020). The least frequently developed category was ‘communication skills’ (26.1%), which could be attributed to the autonomous and fragmented nature of microwork and the bare-bones communication between task requesters and workers that are mediated through minimalist communication features on the platforms.

In contrast to microworkers, most online freelancers (74.1%) reported frequently developing ‘communication skills’ during the past three months, a 48-percentage point difference compared to microworkers. This further strengthens the assertion that fundamental differences exist between the two major forms of crowdwork. ‘Developing personal dispositions’, such as confidence, creativity or resilience, was also reported by most online freelancers (70.7%), a 30-percentage

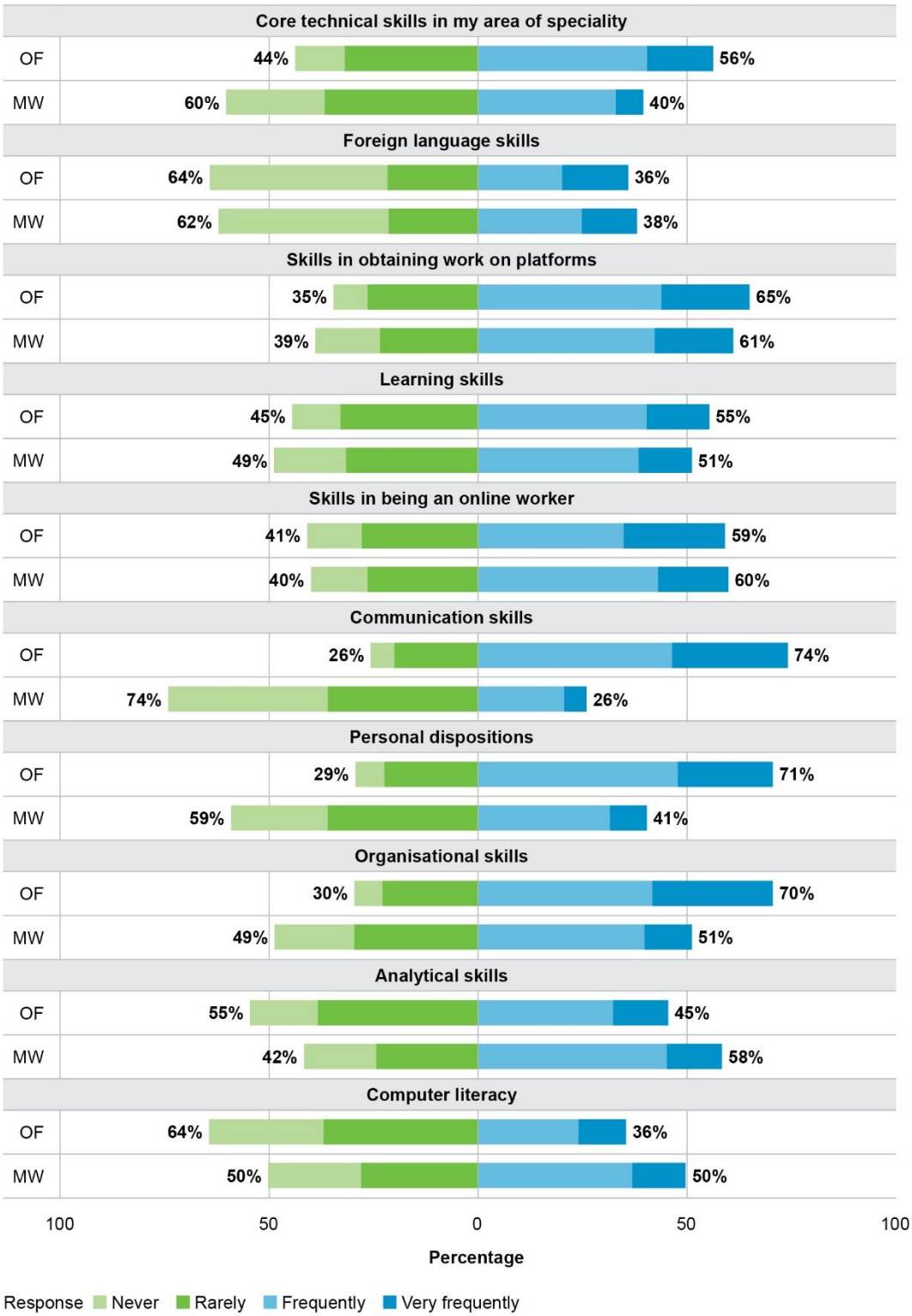
point higher value than microworkers. ‘Organisational skills’, as in time or project management, were reported by 70.3% of online freelancers.

Figure 14. **Communication activities of platform workers**



NB: OF refers to ‘online freelancers’ and MW refers to ‘microworkers’.
Source: Cedefop’s CrowdLearnMW and CrowdLearnOF surveys.

Figure 15. **Skill development of platform workers**

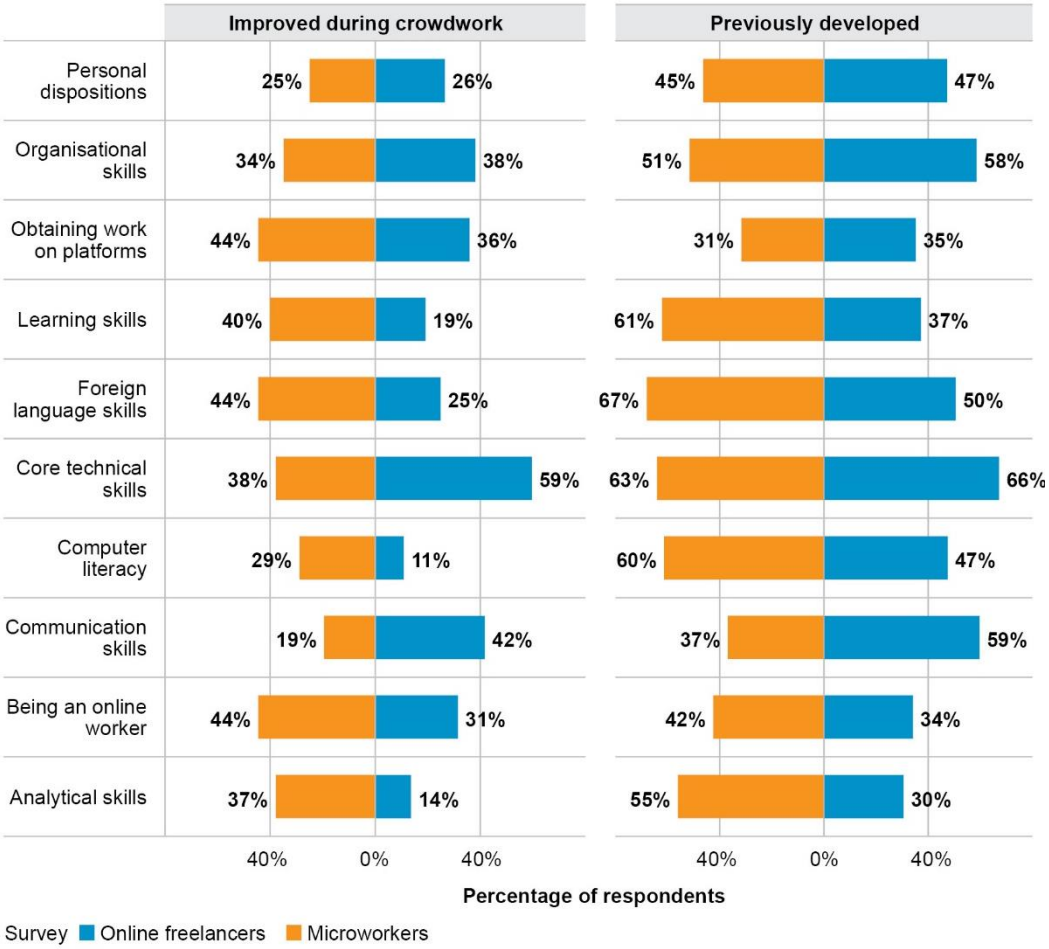


NB: OF refers to 'online freelancers' and MW refers to 'microworkers'.
Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

Based on a typology of skills developed from the original CrowdLearnOF study (Cedefop, 2020), microworkers were also requested to indicate which categories of skills they had developed before and during crowdwork (Figure 16).

In general, microworkers and online freelancers reported they developed most skill categories before their engagement in crowdwork, with the exception of specifically platform-related activities, such as 'being an online worker' or 'obtaining work through platforms'. A major finding of the CrowdLearnOF survey was that a large proportion of online freelancers (59.3%) reported developing their 'core technical skills' during their on-the-job learning. Microworkers seemed to be less engaged in developing these skills (38.2%). A noteworthy difference exists in the analytical skills category, where 37.3% of microworkers reported an improvement during crowdwork, compared to only 13.8% of online freelancers.

Figure 16. **Skill developed before and during crowdwork**



Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

When asked about skills improved during crowdwork, more microworkers reported focusing on the six out of 10 of skill categories. The largest differences were reported in the following categories: analytical skills, computer literacy, learning-to-learn skills, foreign language skills, as well as obtaining work on platforms and skills in being an online worker. In the original CrowdLearnOF study, the survey item on 'skills improved during crowdwork' was used as a proxy for 'skill gaps' among crowdworkers. While the findings here could be possible indicators of gaps in these six categories of skill among microworkers, other plausible explanations are possible.

For example, microworkers may choose to focus on improving and optimising those existing skills because of the demands posed by their particular crowdwork tasks rather than because they have a skill deficiency in that area. In combination with previous insights into the different characteristics of microwork and online freelancing, these findings may further bolster the hypothesis that microworkers, who tend to view their crowdwork as a supplementary activity, may consider that they are developing skills in areas not directly related to their current work or the pursuit of new work opportunities, such as general analytical or learning skills. In comparison, online freelancers may have reported activities more closely related to their areas of specialism.

Workers responding to the CrowdLearnMW survey were given the option of specifying any other skills they felt they had developed through their crowdwork. 287 ([6]) distinct answers were obtained this way, including frequent mentions of improvements in specific data analysis techniques, such as analysing photos and 'tagging videos', how machine learning ('ML') and 'artificial intelligence' training works, and an improved way of 'seeing data' in general. Other frequently mentioned skill improvements included 'concentration' and 'time management' (7.7% of respondents) and skills related to rapid typing, reading and transcription (12.9% of respondents). Participants may have used the free text field to emphasise particularly valuable skills they have gained, such as time management, beyond the generic 'organisational skills' category. Further, they might have had trouble mapping skills related mainly to clerical work, such as transcription and typing, onto the existing categories if they did not consider them core skills for their line of work.

([6]) In total, 307 answers were obtained but those stating no additional skills gained were excluded from the analysis.

3.5.2. Workplace learning activities (WLAs)

When asked about their learning activities, most microworkers (86.8%) reported learning by working alone on their tasks (Figure 17). Another activity frequently mentioned (71.2%) was learning by performing novel tasks. Only a small group of microworkers reported learning by using 'paid online tutorials' (9.6%) or by engaging in 'collaboration' (9.7%) during the course of their crowdwork. This may be due to the lack of availability of such options to microworkers in general, the autonomous nature of their work that does not require collaboration, the nature and (lack of) complexity of the skills they develop through crowdwork, or simply lack of interest in investing their own financial resources to develop particular skills that may require participation in an online tutorial.

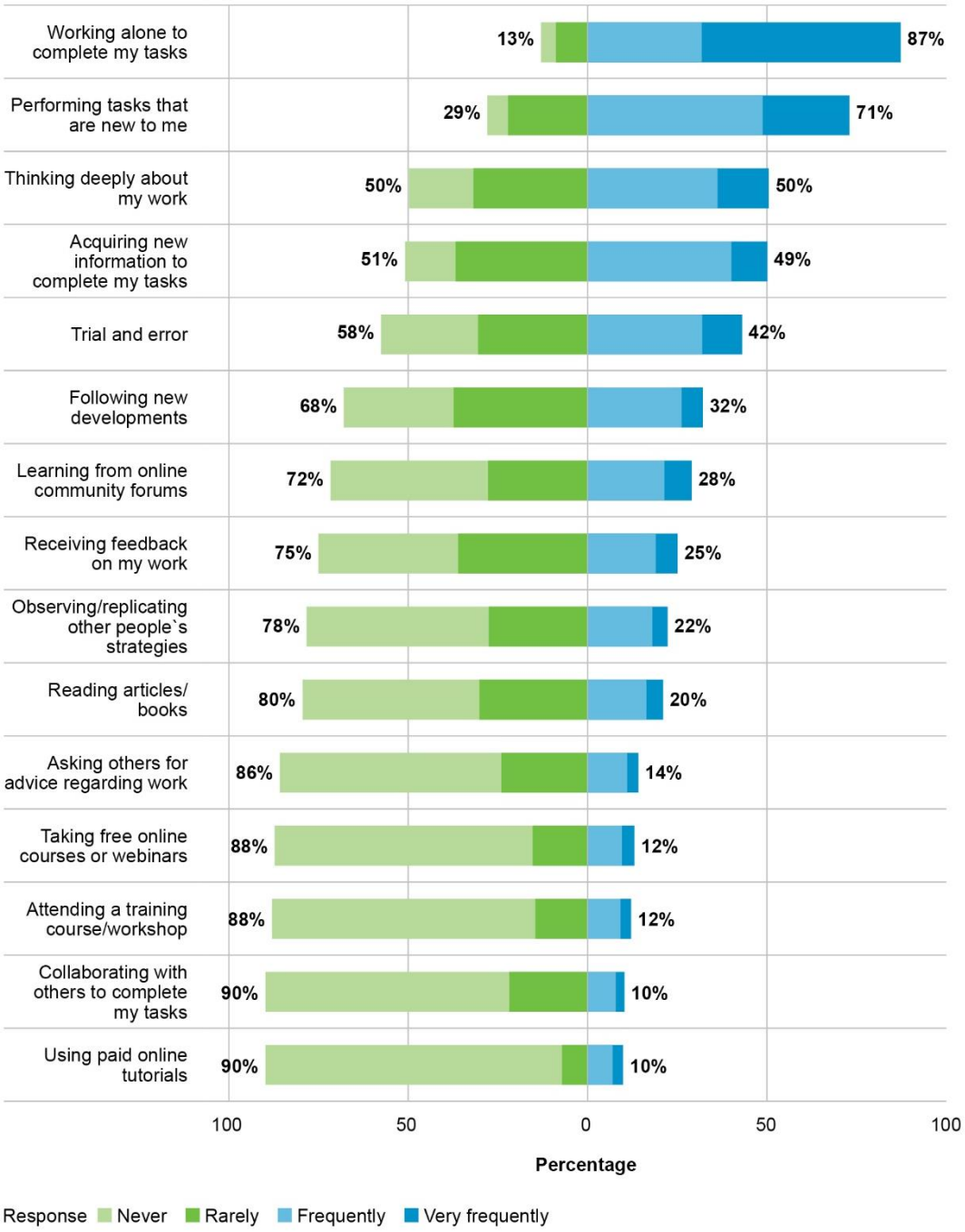
Few microworkers reported using formal learning approaches to develop their skills: this is consistent with earlier findings among online freelancers who reported more extensive use of informal rather than formal learning (Cedefop, 2020).

Similarities exist between the two types of platform worker in that the workplace learning activity that online freelancers most frequently engage in was also 'working alone' (87.2%); 'paid online tutorials' were the least common (11.6%) (Figure 18). 'Thinking deeply about my work' was also a relatively prominent strategy reported across both groups, with 73.2% of online freelancers and 49.7% of microworkers claiming to engage in this activity frequently.

A notable difference is observed in the 'receiving feedback on my work' category, with 70.2% of online freelancers and only 24.5% of microworkers reporting frequent engagement. This 45.7 percentage point difference can be attributed to the less communication-intensive nature of microwork.

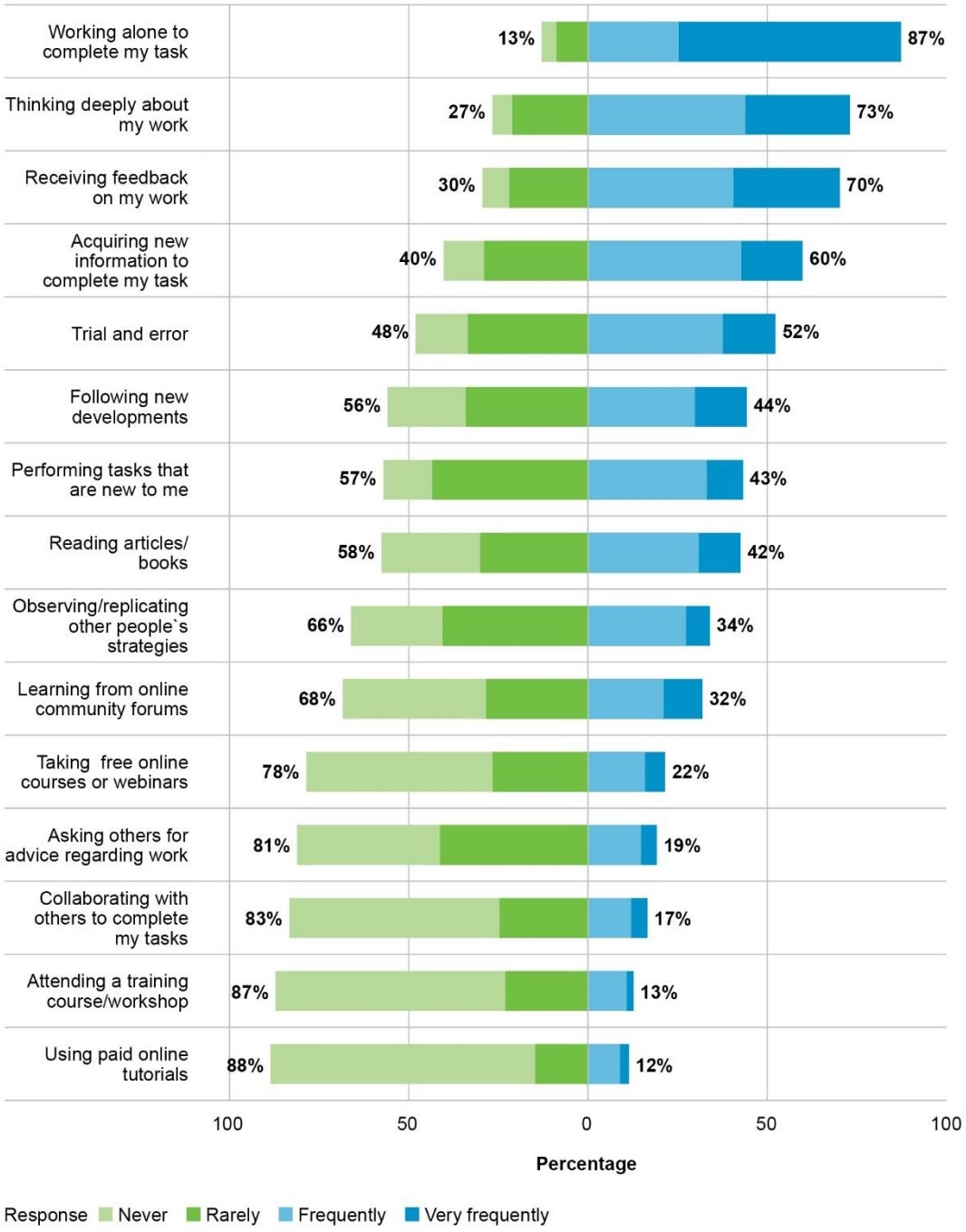
Contrasting patterns also exist with respect to the activity of 'performing tasks that are new to me', as 71.2% of microworkers frequently engaged in this compared to only 43.1% of online freelancers. This can be explained by the nature of task consumption on microwork platforms, where workers tend to complete tasks that are readily available, rather than selecting ones based on their skills (Chilton et al., 2010). Microworkers also have the opportunity to engage with a variety of tasks (Gadiraju; Kawase and Dietze, 2014) that mainly require innate human intelligence. This is in contrast to online freelancers who tend to specialise in a given type of work, and continue to select work they are skilled in.

Figure 17. **Workplace learning activities among microworkers**



Source: Cedefop's CrowdLearnMW survey.

Figure 18. **Workplace learning activities among online freelancers**



Source: Cedefop's CrowdLearnOF survey.

Across all items, the levels of engagement in workplace learning activities were comparable between the two samples, with a calculated average engagement score ([7]) of 1.95 in the microwork and 2.0 in the online freelancing sample.

3.5.3. Self-regulated learning (SRL) strategies

Self-regulated learning (SRL) refers to the 'thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals' (Zimmerman and Kitsantas, 2005). The survey section measuring self-regulated learning strategies (SRLS) was adapted from a previous instrument, SRLWQ (Fontana et al., 2015) based on Zimmerman's cyclical phases model (Zimmerman, 2006), which proposes that individuals self-regulate their learning in three distinct phases (forethought, performance and self-reflection) that individuals engage in while self-regulating their learning. Findings on the 35 scale items are presented according to their cyclical phases.

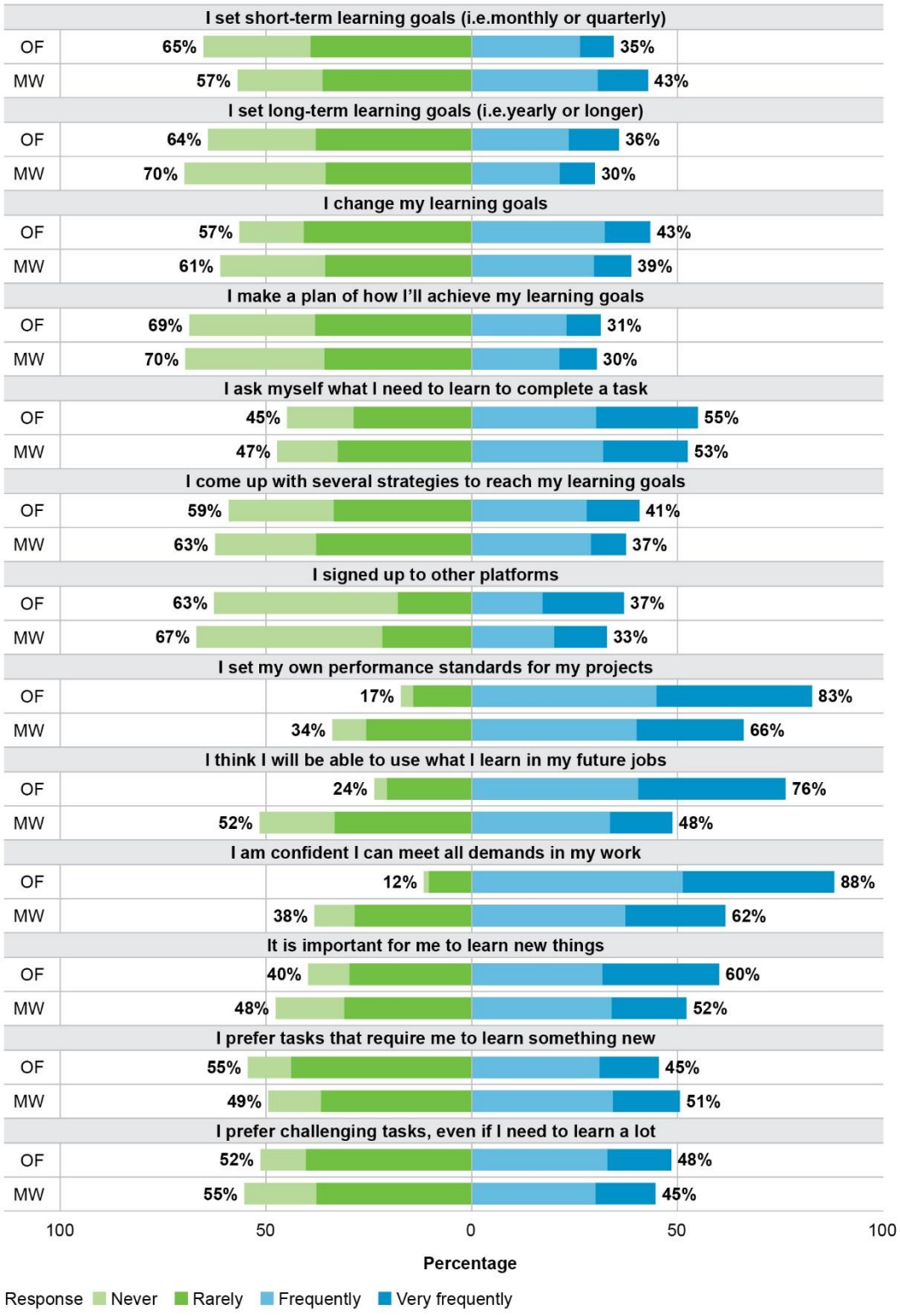
3.5.3.1. *Forethought phase*

In the forethought phase (Figure 19), a majority of microworkers claimed, at least frequently, to 'set performance standards' (66%), be 'confident' in meeting the demands of their work (61.8%) and ask themselves what they needed 'to learn to complete a task' (52.6%). For online freelancers, the two categories with the highest engagement rate were also 'confidence' in meeting demands (88.3%) and setting 'performance standards' (82.9%). Additionally, 76.3% of online freelancers reported frequently considering how their learning from crowdwork might be useful to them in 'future jobs', compared to 48.3% of microworkers who reported doing so.

The findings suggest that online freelancers tend to plan more using a long-term perspective than microworkers who tend to set short-term goals with respect to developing skills that can be immediately useful. This differences in approaches to forethought may be explained by the nature of the tasks these different types of workers undertake, with microwork tasks being smaller-scale, more rapid and therefore necessitating a shorter-term goal orientation.

([7]) We calculated the intensity of engagement by normalising the WLA and SRLS scales and rating their intensity based on the standard deviation into 'low', 'moderate' and 'high' intervals on a scale of 1-3.

Figure 19. **Self-regulated learning strategies (forethought)**



NB: OF refers to 'online freelancers' and MW refers to 'microworkers'.
Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

3.5.3.2. *Performance phase*

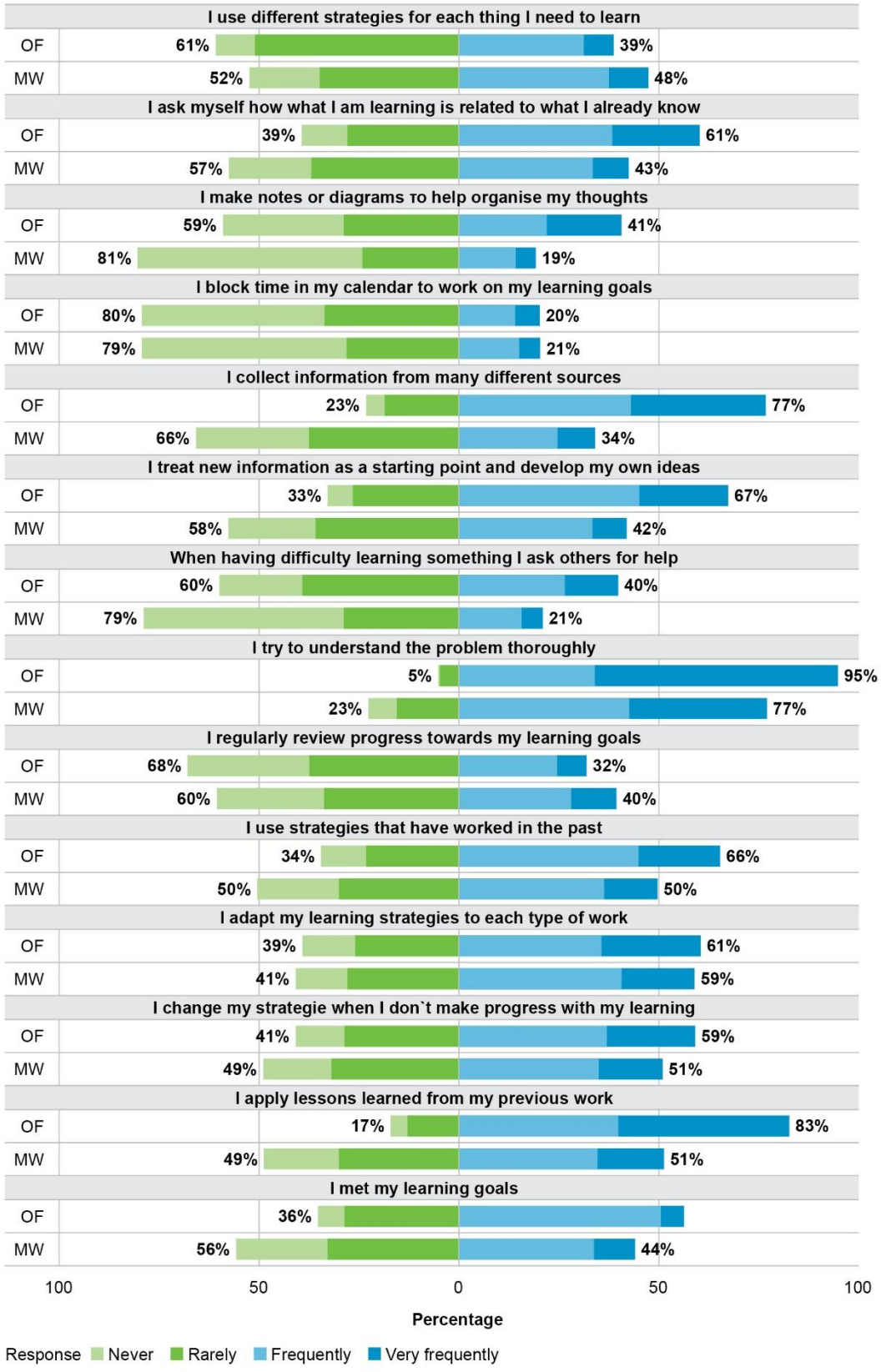
Some noteworthy discrepancies between the samples exist in the scale section associated with the performance phase of self-regulated learning (Figure 20). Almost the entire sample of online freelancers (94.9%) responded that they frequently ‘try to understand the problem thoroughly’, compared to 77.3% of microworkers. Similarly, they reported that they frequently ‘apply lessons learned’ from previous work (82.8%), whereas only 51.4% of their microworking peers did so. This can be at least partially explained by looking at other results of the survey, which indicate that online freelancers are more likely to treat their crowdwork as an extension of their professions and are therefore able to draw on previous work experience. 40.1% of online freelancers also reported frequently asking others for help ‘when having difficulty learning something’, compared to only 21.1% of microworkers; this could be seen as an indication that online freelancers are embedded in stronger professional networks, probably due to their platform-facilitated work being closely related to their regular professional activity.

3.5.3.3. *Self-reflection phase*

Responses in the self-reflection phase (Figure 21), related to recording notes about their learning progress either for personal use or sharing with others, were notably low among both online freelancers and microworkers. Thinking frequently ‘about how what I have learned impacts my work’ was more prevalent among online freelancers (60.2%) than microworkers by 24.4 percentage point. This discrepancy might be attributable to differences in the employment status between the samples and a tendency among online freelancers to see their online work more closely connected to their regular professions.

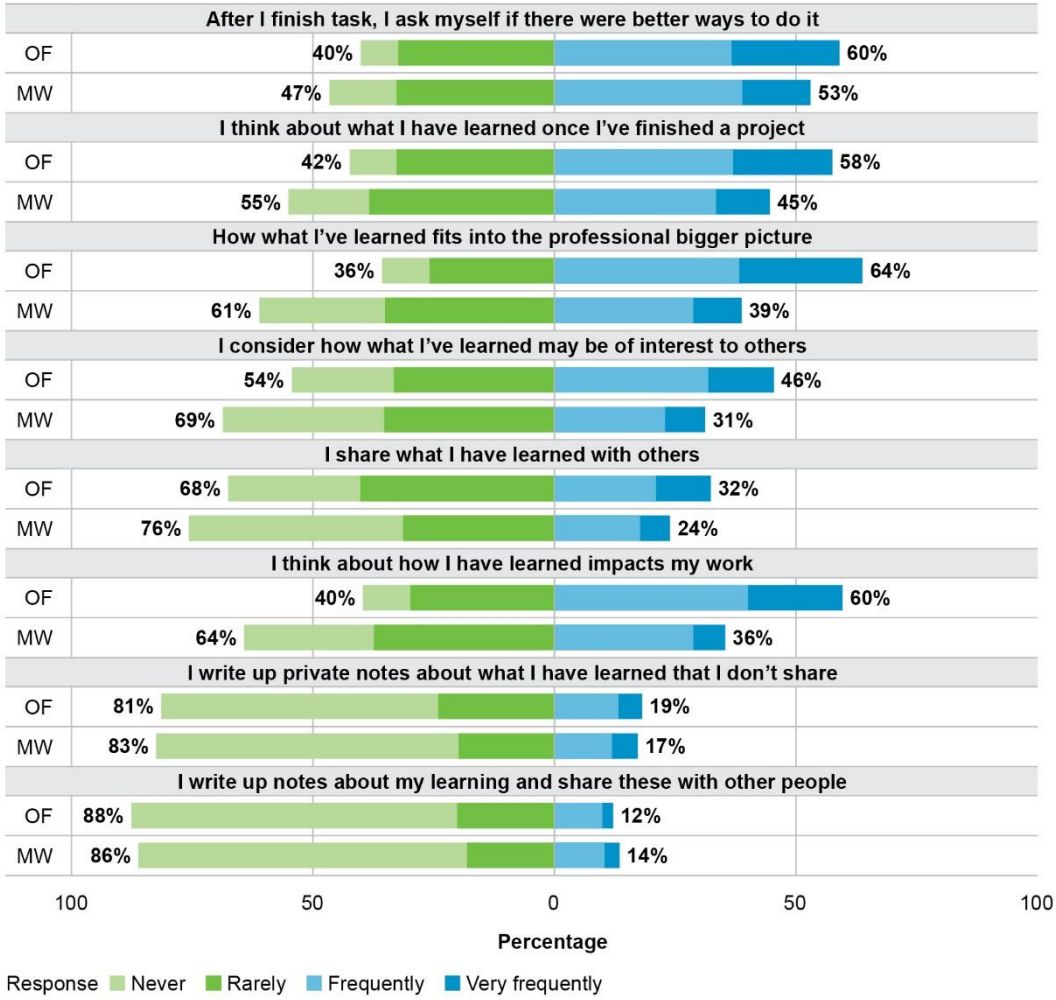
This is corroborated by the responses to the question of how learning fits into the ‘bigger picture of professional development’, which 64.3% of online freelancers think about frequently, compared to only 39.1% of microworkers, who are more likely to see crowdwork as a supplementary activity. Also noteworthy is the tendency among online freelancers to consider how their learning might be of ‘interest to others’ (45.8%) and sharing these insights (32.5%). Microworkers responded lower in these categories with 31.4% and 24.2% respectively claiming to engage frequently in such behaviour. This might indicate a higher level of engagement with fellow crowdworkers and potentially tighter knit networks in the online freelancing community.

Figure 20. **Self-regulated learning strategies (performance)**



NB: OF refers to 'online freelancers' and MW refers to 'microworkers'.
Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

Figure 21. **Self-regulated learning strategies (self-reflection)**



NB: OF refers to 'online freelancers' and MW refers to 'microworkers'.
Source: Cedefop's CrowdLearnMW and CrowdLearnOF surveys.

CHAPTER 4.

Correlational analysis

In this section, we explore statistically significant relationships between the types and frequency of workplace learning activities (WLAs) and self-regulated learning (SRL) strategies that microworkers undertake, and key personal and environmental factors to address research questions RQ2 to RQ5.

These findings should be treated as preliminary and exploratory: the strength of many correlations is affected by the fact that different scale items are correlated individually as variables rather than as summative psychometric scales. Determining the true relationships between the underlying constructs of workplace learning and self-regulation will require further multivariate research and theory-driven analysis.

4.1. Task complexity and microworker learning

To address RQ2, concerning correlations between the complexity and interdependence of microworkers' tasks and their uptake of WLAs and SRL strategies, correlation analysis (Person product-moment correlation ([8])) is performed. This gives first insight into which characteristics of microworker tasks (e.g. their creativeness) have a statistically significant effect on the intensity of their engagement in workplace learning and self-regulated learning behaviour (Table 2).

The intensity of engagement is calculated by normalising the WLA and SRL scales and rating their intensity based on their standard deviation into 'low', 'moderate' and 'high' intervals (SRL-I and WLA-I, respectively). Based on the descriptive assessment of the survey data, it was evident that microwork, compared to online freelancing, is primarily an activity associated with routine tasks. It was hypothesised that work requiring more active engagement and more complex skills, for instance a combination of knowledge or creativity, would be related to higher levels of SRL, which is defined by the planning and adaptation and self-reflection on learning goals to match the requirements of the work.

([8]) Given that most variables analysed in this section have been measured with Likert-scales, Spearman's rank-order correlation coefficients have also been calculated. In all cases it has been confirmed that little difference exists between the Pearson and Spearman correlation approaches. All results are available upon request.

Table 2. **Correlations between crowdwork tasks and microworkers' self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
Routine	0.64	0.48	-.08*	-.05
			[-.14, -.02]	[-.11, .01]
Formal processes	0.28	0.45	.05	.09**
			[-.01, .11]	[.02, .15]
No freedom	0.22	0.42	-.01	.04
			[-.07, .05]	[-.02, .10]
Repeatable	0.50	0.50	-.06*	-.01
			[-.13, -.00]	[-.07, .05]
Standards	0.30	0.46	.05	.07*
			[-.01, .11]	[.01, .13]
Combination of knowledge	0.25	0.43	.18**	.15**
			[.12, .24]	[.08, .21]
Creative	0.24	0.43	.17**	.17**
			[.11, .23]	[.11, .23]
Specific expertise	0.21	0.40	.10**	.09**
			[.04, .16]	[.03, .15]
Collaboration	0.06	0.24	.12**	.11**
			[.06, .18]	[.05, .17]
General expertise	0.24	0.42	.08**	.07*
			[.02, .15]	[.01, .13]
Subjective	0.24	0.42	.07*	.07*
			[.01, .13]	[.00, .13]
New problems	0.23	0.42	.09**	.07*
			[.03, .15]	[.01, .13]
Unique solutions	0.15	0.35	.18**	.12**
			[.11, .23]	[.05, .18]
Varied skills	0.33	0.47	.16**	.18**
			[.09, .22]	[.12, .24]
Complex skills	0.09	0.29	.17**	.13**
			[.11, .23]	[.07, .19]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnMW survey.

The correlational analysis indicates that statistically significant positive relationships exist between the intensity of SRL and the following characteristics of microwork: requiring the combination of knowledge from different fields as well as general- and task-specific expertise, being improvisational or creative, requiring a varied skill set and complex, high-level skills, and requiring unique ideas or solutions to new problems. A collaborative nature of the work performed is also positively related to SRL intensity.

The above findings suggest that microworkers who perceive their crowdwork as more complex and interdependent, report higher uptake of self-regulatory learning strategies, whereas more repeatable or mundane types of work do not have the same effect. However, further research – particularly a more thorough statistical model – is needed to explain better the true complex relationship between the perceived nature of microwork tasks and SRL behaviour.

A similar pattern emerges when examining the association of microwork tasks with the intensity of WLA uptake. A statistically significant ($p<.01$) relationship is observed between the intensity of microworkers' engagement in workplace learning and their crowdwork tasks, specifically those requiring a combination of knowledge and being creative, collaborative and relying on specific/general expertise. Additionally, it is found that the perceived variety and complexity of skills, as well as the need to find unique solutions required to complete crowdwork, is related to the uptake of WLAs. Reliance on formal processes, such as clear definition of input and output and structured interactions with clients, is also correlated with the intensity of WLA uptake.

While a more rigorous examination of such relationships is required in future work, these preliminary results are an indication that the uptake of WLA and microworkers' SRL behaviour may be dependent on the extent to which their task design is creative and engaging. The preliminary findings may also suggest that task design may potentially promote microworkers' uptake of learning activities and foster self-regulatory learning behaviours at work.

4.2. Motivation for crowdwork and microworker learning

To address RQ3 concerning potential correlations between microworkers' motivations for engaging in crowdwork and their uptake of WLAs and SRL strategies, correlation analysis (Person product-moment correlation) is performed (Table 3). Based on the descriptive results of the CrowdLearnMW survey it was hypothesised that microwork (compared to online freelancing) is often a supplementary activity that workers perform in addition to regular work or education.

The correlational analysis uncovers positive statistically significant ($p<.01$) relationships between SRL and the following motivations for engaging in microwork: earning extra income, not wishing to 'kill time' (i.e. doing the activity for reasons other than as a pastime), having fun, following one's passions, being one's own boss / self-employed, earning money while being able to fulfil social obligations, controlling one's own schedule, having more choice over the nature of

the projects, and wishing to gain extra technical skills while retaining the stability of a regular job. This is partly in line with our assumptions that microwork is mainly a productive activity performed during microworkers' spare time for enjoyment, skills attainment or extra income ([9]).

Similar results are found for the intensity of WLAs, which is related in a statistically significant way (p<.01) to the motive of earning primary or secondary income, more choice, fun/enjoyment or following one's passion and not 'killing time' (i.e. for reasons other than as a pastime). The intensity of WLA uptake is additionally related to the flexibility of the work arrangement, including the motivation of controlling one's own schedule, having additional opportunities to fulfil social obligations and being one's own boss. The combination of additional income, enjoyment and flexibility seems to encourage WLA uptake among microworkers.

Table 3. **Correlations between crowdwork motives and microworkers' self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
Fruitful activity	0.60	0.49	.05	.02
			[-.02, .11]	[-.04, .08]
Secondary income	0.41	0.49	.09**	.16**
			[.03, .16]	[.10, .22]
Kill time	0.46	0.50	-.15**	-.09**
			[-.21, -.09]	[-.15, -.03]
Primary income	0.09	0.28	.08*	.09**
			[.01, .14]	[.03, .15]
Fun	0.45	0.50	.17**	.12**
			[.10, .22]	[.06, .18]
More choice	0.24	0.43	.09**	.12**
			[.03, .16]	[.05, .18]
Unable to work	0.16	0.36	.02	.01
			[-.04, .08]	[-.05, .08]
No commute	0.31	0.46	.04	.05
			[-.03, .10]	[-.01, .11]
Control over schedule	0.33	0.47	.11**	.13**
			[.05, .17]	[.06, .19]
Higher income	0.05	0.22	.05	.08*
			[-.01, .11]	[.02, .14]
Unable to find work	0.06	0.24	.05	.07*
			[-.01, .11]	[.01, .13]

([9]) The interplay between extrinsic and intrinsic motivations to engage in crowdwork and microworkers' self-regulated learning should be analysed more thoroughly in future research.

Variable	M	SD	SRL-I	WLA-I
Social obligations	0.21	0.41	.09**	.08**
			[.02, .15]	[.02, .14]
Passion	0.08	0.27	.14**	.13**
			[.07, .20]	[.07, .20]
Own boss	0.27	0.44	.19**	.17**
			[.13, .24]	[.11, .23]
Extra technical skills	0.24	0.43	.21**	.13**
			[.15, .27]	[.06, .19]
No dress code	0.18	0.38	.03	.05
			[-.03, .09]	[-.02, .11]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * p < .05. ** p < .01.

Source: Cedefop's CrowdLearnMW survey.

These findings are also reflected in the correlations between the survey variables measuring how crowdworkers feel about their self-employed status and their SLR/WLA intensities (Table 4). It is worth noting that being proud to be an entrepreneur, accepting crowdwork because it is better than formal employment, and seeing oneself as a freelancer or own boss are all correlated with the intensity of SRL and WLA uptake.

Table 4. **Correlations between microworkers' perceived self-employment status and their self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
Being own boss	4.01	0.99	.16**	.10**
			[.10, .22]	[.04, .17]
Being a freelancer	3.35	1.16	.26**	.16**
			[.20, .31]	[.10, .22]
Better than formal employment	3.75	1.11	.18**	.12**
			[.12, .24]	[.05, .18]
Proud to be an entrepreneur	3.91	1.03	.21**	.10**
			[.15, .27]	[.04, .16]
Not a lot of risk involved	2.64	1.29	.15**	.05
			[.09, .21]	[-.01, .11]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnMW survey.

Based on this insight, it is further hypothesised that identifying oneself as an entrepreneur would be linked in a statistically significant way to WLAs and SRL, since self-employment is commonly associated with additional income and increased flexibility (Table 5). The results of the correlational analysis suggest that

a positive statistically significant (p<.01) relationship exists between identifying as an entrepreneur and engaging in WLAs and SLR strategies. It is therefore recommended that entrepreneurial identity should be identified in future models analysing the impact of microwork motivation on individuals' learning activity and self-regulated behaviour.

Table 5. **Correlation between microworkers' perceived entrepreneurship status and their self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
Identifying as an entrepreneur	0.33	0.47	.21**	.16**
			[.15, .27]	[.09, .22]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnMW survey.

4.3. Intensity of crowdwork and microworker learning engagement

To address RQ4, concerning the intensity of microworkers' engagement in crowdwork and its relationship to their uptake of WLAs and SRL strategies, we interpreted both the number of previously completed HITs (ranging in intervals from 'none' to 'over 1 000 Hits') and the hours spent microworking over the previous week (ranging in intervals from 'none' to '>40 hours') as indicators of workers' overall engagement in microwork. To determine whether a statistically significant relationship exists between microworkers' completed tasks or their invested time and their propensity to engage in learning activities during microwork or adopt self-regulation strategies, we performed correlation analysis (Person product-moment correlation) as shown in Table 6.

The results indicate that a statistically significant (p<.01) relationship exists between the overall intensity of WLA and SRL and hours worked. Again, this could indicate that the associated variables are components of a more complex model explaining the true nature of the relationship between engagement, self-regulation and workplace learning in crowdwork.

Successful and productive self-regulation has also been linked to a more satisfactory work experience (Kanfer; Chen and Pritchard, 2008). This is corroborated by a positive statistically significant correlation between microworkers' enjoyment of working on the platform (MTurk), ranging from 'not at all' to 'always true', and their uptake of self-regulated and workplace learning strategies.

Table 6. **Correlation between microworker intensity of engagement in crowdwork and their self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
HITS completed	2.09	1.65	-.07*	.06
			[-.13, -.01]	[-.01, .12]
Hours worked (previous week)	1.37	1.24	.11**	.21**
			[.05, .17]	[.15, .27]
Enjoyment working on MTurk	2.77	0.74	.40**	.29**
			[.35, .45]	[.23, .35]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnMW survey.

The overall proportion of microworkers claiming to engage in communication activities, such as socialising with other workers on online forums, was relatively low, with the exception of personal and family-related communication. Based on insights from the literature (Billett, 2001) that identify social interaction with fellow workers as a key engagement factor in the workplace, we hypothesised that workers engaging in such behaviour would show increased workplace learning activity and self-regulated behaviour compared to their peers who do not.

The correlational analysis shown in Table 7 confirms that there is a statistically significant correlation between microworkers' tendency to participate in an online forum related to online work and their uptake of workplace learning activities. Significant relationships also exist between online forum participation and self-regulated learning strategy uptake and between face-to-face and digital communication with online workers and both WLA and SRL. Workers who go the extra mile to network and communicate with their peers, as well as friends and family, beyond the platforms appear to be more engaged in learning than those who do not. This confirms the significant role of informal learning, as is also often noted to be the case for workers in the conventional labour market (Cedefop, 2015), even if such learning takes place exclusively in the digital space when concerning crowdworkers.

Table 7. **Correlation between microworkers' communication activities and their self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
Relevant online forums	2.29	1.34	.33**	.40**
			[.27, .38]	[.34, .45]
Face-to-face with online workers	1.78	1.27	.26**	.29**
			[.20, .32]	[.23, .34]
Digital communication with online workers	2.22	1.51	.26**	.30**
			[.20, .32]	[.24, .35]
Online communication with friends and family	4.64	1.61	.18**	.12**
			[.12, .24]	[.06, .18]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnMW survey.

4.4. Self-regulation phases and microworkers' learning

To address RQ5, the overall relationship between SRL and WLA intensity and each constituent phase (forethought, performance and self-reflection) of the self-regulation model underpinning the SRL scale (Zimmerman, 2006) was first compared and a correlational analysis was subsequently performed.

Table 8. **Correlation between different phases of self-regulated learning and microworkers' overall self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
WLA-I	1.95	0.79	.59**	
			[.55, .63]	
SRL-Forethought	2.00	0.80		.54**
				[.50, .58]
SRL-Performance	2.02	0.77		.56**
				[.52, .60]
SRL-Self reflection	2.01	0.80		.54**
				[.50, .59]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnMW survey.

In the sample of microworkers (CrowdLearnMW), a statistically significant correlation (p<.01) is identified between the general uptake of WLAs and SRL strategies. The analysis of the individual phases of SRL yield a statistically significant (p<.01) positive correlation in each case. However, no interpretable difference is found between engagement in the different phases of the cyclical model of self-regulation and (crowd)workplace learning among microworkers.

The same analysis was subsequently performed using the original CrowdLearnOF data collected from online freelancers (Table 9) and obtained overall similar, albeit slightly weaker, results. The differences in the cyclical nature of self-regulatory learning behaviour between microworkers and online freelancers could be examined more thoroughly in future research.

Table 9. **Correlation between different phases of self-regulated learning and online freelancers' overall self-regulated learning and workplace learning activities**

Variable	M	SD	SRL-I	WLA-I
WLA-I	2.00	0.80	.51**	
			[.46, .55]	
SRL-Forethought	2.02	0.78		.47**
				[.42, .51]
SRL-Performance	2.05	0.79		.48**
				[.43, .53]
SRL-Self Reflection	2.01	0.84		.43**
				[.38, .48]

NB: M and SD represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * $p < .05$. ** $p < .01$.

Source: Cedefop's CrowdLearnOF survey.

CHAPTER 5.
Conclusions

Several key conclusions and recommendations can be formulated from this study.

5.1. Microwork as a viable option for additional income

The majority of microworkers in the CrowdLearnMW study suggested that they did not rely on microwork as a primary source of their income, with only 8.9% suggesting that earning primary income through microwork motivated them to undertake this form of work. This contrasts with 20.2% of the CrowdLearnOF sample of online freelancers for whom earning primary income from crowdwork is a main motivating factor. The CrowdLearn findings suggest that microwork can be a viable source of earning a secondary income for microworkers (40.7%) as well as online freelancers (43.7%). 30.9% of the microworkers in the study reported to be studying compared to 13.2% of the online freelancer sample. This highlights the potential of microwork in supplementing the income of young people.

Since there appears to be continuous demand for online microwork (evidenced by the growing number of microtask crowdsourcing platforms in Europe), policy-makers could explore the opportunities presented by microwork to help increase (part-time or secondary) employment among citizens with underutilised human capital or those with hours, income or other constraints.

By creating awareness campaigns to increase participation and engagement in microwork, building worker-centric platforms to serve specific needs and fostering healthy relationships between all the actors involved (clients/task requesters, microworkers, platform owners), microwork presents an opportunity for individuals to find more work or supplement existing incomes. This could be part of the EU's response to the economic fallout of the COVID-19 pandemic (Qiu; Gadiraju and Bozzon, 2020b; Sawyer et al., 2020; Tang, 2020). Policies could be put in place to support large numbers of furloughed workers across the continent to earn income though online platforms.

5.2. Microwork and labour market reintegration

The findings also showcase the potential of microwork in reintegrating marginalised groups (for example, retired or disabled individuals and the unemployed) into the labour market. This is all the more relevant since

microworkers reported generally high levels of enjoyment while completing crowdwork tasks. Prior studies have highlighted the ambivalent implications of digital labour platforms for work and employment (Pesole et al., 2018). On one hand, they have the potential to lower the entry barriers to the labour market, facilitate work participation through effective matching mechanisms and improve the working conditions of workers: people with disabilities or health conditions, youth, older workers, unemployed individuals, people with a migrant background. On the other hand, digital labour platforms such as microwork platforms typically rely on a workforce of independent workers whose conditions of work, representation and social protection are unclear or unfavourable.

For instance, Cedefop's CrowdLearn studies have highlighted that over 30% of online workers in Europe are immigrants (Cedefop, 2020). The broadening landscape of crowdwork in Europe over the last decade has coincided with an influx of migrants and refugees across EU Member States. Although online work opportunities have provided migrants and refugees with viable means of earning a livelihood, few efforts have focused on optimising learning-related outcomes in online work and helping with the integration of migrants into the local population through sharing online workspaces and building offline communities.

Drawing on a balanced assessment of the opportunities and challenges of crowdwork, policy-makers could consider initiatives to help engage refugees and other marginalised groups in microwork platforms as a temporary measure to help facilitate labour market integration and skill development. In doing so, they can draw on examples and experiences from crowdwork platforms with a social mission, such as Samasource, which provide work opportunities to low-income workers in developing countries and, at the same time, offer the necessary digital skills training to engage in crowdwork.

5.3. Supporting skill development in microwork

Microworkers (and online freelancers) generally develop most of their skills before their engagement in crowdwork, except for specifically platform-related activities, such as 'being an online worker / [a freelancer]' or 'obtaining work on platforms'.

When asked about which skills microworkers had developed over the past three months, they most frequently reported developing 'skills in obtaining work on platform[s]' (61.1%), 'skills in being an online worker' ([10]) (60.1%) and 'analytical

([10]) The survey item was worded as 'Through work on [Platform], I developed skills in being a freelancer (e.g. how to get business permits, taxation, working alone, etc.)' for online freelancers and 'Through work on MTurk, I developed skills in being an online

skills' (58.4%) as their top three skills categories. This can be explained by the time required for microworkers to develop the necessary skills to build good reputations, understand how best to access a large enough amount of good work, and to identify well-paying tasks and trustworthy clients to maximise their earnings.

Over the years microwork has gained prominence due to the relatively simple nature of work that requires innate human intelligence (Surowiecki, 2005). Most tasks that microworkers engage with, therefore, do not require a special set of skills. This may explain why in the case of microwork, how workers think about their work also reflects a surface-level engagement with tasks. 'Thinking deeply about my work' was prominently reported by online freelancers (73.2%), while only 49.7% of microworkers claimed to engage in this activity, at least frequently. Similarly, online freelancers are more prone to self-reflection in comparison to microworkers. Thinking frequently 'about how what I have learned impacts my work' was more prevalent among online freelancers (60.2%) than microworkers by over 24 percentage points.

Additionally, 76.3% of online freelancers reported that they frequently consider how their learning will be useful to them in 'future jobs', compared to 48.3% of microworkers. Almost the entire sample of online freelancers (94.9%) in the CrowdLearnOF study responded that they frequently 'try to understand the problem thoroughly', compared to 77.3% of microworkers. Similarly, online freelancers reported that they frequently 'apply lessons learned' from previous work (82.8%), whereas only 51.4% of their microworking peers did so. This could be due to the faster-paced and fragmented nature of microwork that, in comparison to online freelancing, may afford fewer opportunities to engage in self-reflection.

5.4. Promoting more creative and complex microwork

The CrowdLearnMW findings indicate that many microworkers perceive their tasks as repetitive and monotonous, corroborating evidence from prior work (Gadiraju and Dietze, 2017). In contrast, online freelancers' tasks appear to be relatively more complex and creative. However, research advances in microwork have indicated the suitability of microtask platforms in accomplishing both creative and complex work, also referred to as macrotask crowdsourcing (Doroudi et al., 2016 ; Haas et al., 2015; Valentine et al., 2017).

Macrotask crowdsourcing has been defined to be innately linked with skill diversity, and more fine-grained skill types, including expert and 21st century skills,

worker (e.g. how to earn a livelihood online, taxation, working alone, etc.)' for microworkers.

as well as valid skill identification and evaluation mechanisms (Lykourentzou et al., 2019). Examples of higher order cognitive and 21st century skills that workers might need to complete such tasks include: creativity, curiosity and imagination, critical thinking and problem-solving, effective oral and written communication skills, information analysis, agility, adaptability and the capacity to learn new knowledge fast, collaboration ability, communication skills, taking initiative, leadership and people management skills (Wagner, 2014).

The opportunity to develop such richer and specialised skill sets can be fostered by creating appropriate workflows and task designs to decompose and manage complex/creative work. For example, workers can develop writing skills through tasks that require creative generation of content. Task decomposition methods, however, should cater to optimising skill development rather than only for being consumable as a microtask. Typical task decomposition in microtask crowdsourcing workflows amounts to breaking down work into smaller units of non-complex activities that do not particularly consider skill-augmentation of workers. To this end, novel workflows and task decomposition methods that specifically focus on optimising skill development among workers are needed.

Policy-makers can support initiatives and platforms that build and promote support for complex and creative work to be executed in microwork marketplaces. This can be beneficial to microworkers, since creative and complex work has been shown to improve worker engagement and be mentally stimulating. Specifically, policy-makers can attempt to incentivise platforms to optimise for skill-augmentation of workers, so that the worker population can gradually upskill and become capable of taking on new types of tasks requiring those skills. This can, in turn, attract new clients who can turn to such platforms, creating the potential for a sustainable demand and supply of tasks. Although skilled and complex work is likely to warrant higher costs on microtasking platforms, clients on similar platforms have shown the inclination to reward high-quality work with commensurate pay (Hara et al., 2018).

5.5. Encouraging self-regulatory learning

Another major implication of the CrowdLearnMW study is the importance of self-regulatory learning (SRL) skills for microwork. Workers need a baseline level of self-regulatory skills to plan, implement and evaluate their own learning and engage in skill development that can enable them to find better-paid and stimulating tasks, understand the complex and sometime opaque platforms interfaces, workflows and rules, identify trustworthy clients, and generally succeed in platform work.

The study suggests that workers who are more highly self-regulated learners engage in more creative and complex tasks and more workplace learning. The importance of SRL skills was highlighted in the policy recommendations of the original CrowdLearnOF study of online freelancers (Cedefop, 2020) and it strongly applies to microwork as well. Therefore, education institutions, including vocational training institutions, should help people develop self-regulated learning skills. This can be achieved through designing educational and training experiences in such a way that the SRL behaviours are fostered and rewarded.

5.6. Bridging communication gaps in microwork

Microwork marketplaces have been recognised to exhibit power asymmetry between workers and task requesters (Irani and Silberman, 2013) and there are often issues related to the absence of open and fluid channels of communication (McInnis et al., 2016).

In this study it is found that face-to-face interaction with other online workers is slightly higher among microworkers, with 18.2% reporting at least weekly interactions, compared to 16.5% of online freelancers. In contrast, communication via online channels is higher by seven percentage points in the online freelancer sample, due to a greater reliance on communication and relatively lesser power asymmetry on most online freelance platforms.

The skills least frequently developed by microworkers are ‘communication skills’ (reported by 26.2% of the workers). This is likely the result of the autonomous and fragmented nature of microwork and the bare-bones communication between task requesters and workers mediated through minimalist platform features. In contrast to microworkers, most online freelancers (74.1%) reported frequently developing communication skills during the past three months. 39.9% of online freelancers also reported frequently asking others for help ‘when having difficulty learning something’, compared to only 21% of microworkers. This signals that many microworkers cannot rely on peer networks if they need help in learning new skills.

The findings corroborate this well-known characteristic of microwork marketplaces and call on platforms and policy-makers to act to bridge the communication gaps between clients/task requesters and workers, building a sustainable microwork labour market.

Acronyms

Cedefop	European Centre for the Development of Vocational Training
EU	European Union
Eurofound	European Foundation for the Improvement of Living and Working Conditions
ML	machine learning
MTurk	Amazon Mechanical Turk
OFs	online freelancers
RQs	research questions
SRL	self-regulated learning
SRLWQ	self-regulated learning at work questionnaire
SME	small and medium-sized enterprise
VET	vocational education and training
WLA	workplace learning activity

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Skill development in the platform economy

Comparing microwork and online freelancing

This new Cedefop CrowdLearn study undertakes a comparative analysis of skill development and workplace learning practices among two major types of online platform work: online freelancing and microwork. It combines information on microworkers drawn from Amazon's Mechanical Turk platform with the original CrowdLearn sample of online freelancers surveyed from three major online labour platforms (Fiverr, Upwork, PeoplePerHour). The research compares the types and frequency of use of workplace learning activities and self-regulated learning strategies adopted by these two main types of crowdworker.

The first of its kind internationally, this comparative study generates additional insights and policy recommendations on how to foster workplace learning and skill development in the platform economy. It highlights the potential role of microwork as a viable avenue for labour market integration, income supplementation and skill development opportunities for workers who otherwise underutilise their skills. Supporting skill development in 'voluntary' microwork could be a relevant course of policy action for the EU in dealing with the economic fallout and recovery from the COVID-19 pandemic.

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