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A Systematic Review of Learning Opportunities Within the Crowdworkers' Workplace

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Abstract

This systematic review used a qualitative content analysis (QCA) and co-occurrence analysis of scientific papers from multiple disciplines published between 2011 and 2021. It could identify learning opportunities within the crowdworkers' workplace, ranging from work management via brand-building and technology-use to the engagement with the community interface, considering multiple constituents of the crowdworkers' workplace such as locations and their infrastructure, as well as working hours and expectations by society. The degree to which such learning opportunities occur is shaped by the crowdwork platform, the community interface, digital devices, and the individual workplace environment they encounter. To grasp the reality of crowdwork, the CPSS meta-model by Yilma et al. (2021), Goller's concept of agentic actions (2017), and Billett's workplace curriculum model (2020) are used.

Keywords: crowdwork, microwork, gig economy, systematic review, workplace learning

1. Crowdwork

There are various terms to describe workers of the gig economy: crowdworkers, gig workers, microworkers, online freelancers, or clickworkers. While the gig economy also includes offline workers like Uber drivers using app-based crowdworking platforms who deliver their services location-bound, this study focuses on crowdworkers interacting and delivering their services like online freelancers and microworkers who use web-based labor platforms. These labor platforms use a digital platform-mediated model for sourcing work from a large number of defined or undefined individuals to crowdworkers. In general, the platform-mediated model is based on one type of crowdsourcing model: Tasks are given to selected individuals which involve paid work with financial remuneration (Berg et al., 2018; Idowu & Elabanna, 2021; Kuek et al., 2015). From the clients' perspective, crowdwork provides the functional, task-oriented sourcing of labor and access to a global pool of highly skilled workers with low organizational, legal, and employment commitment. Therefore, crowdworkers are often confronted with precarious working conditions such as short-term job agreements, wage pressure, and long working hours that potentially harm the physical and mental health of crowdworkers (Schlicher et al., 2021). Most studies do not explicitly distinguish between micro- and macro-workers as distinct types of crowdworkers, arguing that both share the characteristics that financial remuneration is clearly defined and paid from the client to the crowdworker (Gray, 2004; Gutheil, 2018; Schulte et al., 2020; Zakariah et al., 2018). Hence, this study uses the term crowdworker to include both, microworkers and freelancers, and does not explicitly distinguish between them, unless the results imply or call for a necessary distinction.

Crowdwork is a growing type of employment on the global labor market. With evolving access to technology, workers from developing countries will contribute to the increase in size of the gig economy. Hence, at a global scale it can potentially reduce rising unemployment (Berg et al., 2018). Especially throughout the Covid-19 pandemic, crowdwork as a type of employment has gained traction (Margaryan, 2022). There is an estimated number of 163 million crowdworkers worldwide. However, these estimates are potentially biased due to multihoming and multi-working as potential error sources when trying to track their work activities because they work from multiple locations and use multiple accounts on multiple crowdworking platforms (Kässi et al., 2021). Although the estimated number of crowdworkers worldwide differs across research, it can be concluded that the overall number is increasing (Chan & Wang, 2018; Huws et al., 2017; Kuek et al., 2015).

1.1 Characteristics

Typically, crowdworkers are self-employed and have no legal protection. Hence, laws and regulations play a vital role in organizing the social security of crowdworkers. Since they are not protected by labor law, they often face exploitative conditions such as extremely long working hours and low wages. Moreover, the local labor market must be considered, which determines the income to live at a certain location. While rates of Indonesian crowdworkers can be very low, rates of US crowdworkers are much higher. Therefore, the local labor market, including its wages and other work opportunities outside the platform, must be considered relevant aspects of crowdwork. This becomes important when work must be managed and rates must be assessed and set. Additionally, infrastructural conditions must be considered when choosing work locations and equipment, because crowdwork is dependent on it (e.g., a computer, electricity, an Internet connection) and therefore can alter work experiences (Anwar & Graham, 2021).

Other important aspects to be considered are personal networks as well as friends and family, which on the one hand offer social support, like offline communities, and on the other hand put temporal constraints on the crowdworker, primarily female crowdworkers who must care for their children (Rani & Furrer, 2019). Furthermore, Gerber (2020a) states that some crowdworkers need to work in sync with their clients and frequently be available during certain working hours to answer client requests swiftly because otherwise the job would expire after 12 hours of no response, even if the client is from another time-zone. Moreover, multiple clients have preferences when it comes to the origin of crowdworkers, challenging them with discrimination. Hence, crowdwork is fundamentally different from traditional work settings in the sense that it is autonomous, fragmented, and radically distributed. Crowdwork tasks are normally designed to be done autonomously (Margaryan, 2022). As crowdworkers must organize their work themselves and are free to accept or deny jobs, flexibility is an important feature of crowdwork, requiring high motivation as well as self-discipline (Deng & Joshi, 2016; Gajewski, 2018). Using their self-regulation capabilities, they need to establish their own way of working. Therefore they need to consider aspects of their private lives as well as their personal health conditions, skilled trades and preferences.

Harteis (2022) emphasizes that the more flexibly work is organized, the more important standby on-call availability becomes. This statement is especially true for crowdwork, because most crowdworkers feel pressured by the feeling that they must always be online to receive lucrative jobs (Shevchuk et al., 2021).

1.2 Challenges and Learning Opportunities

The challenges crowdworkers encounter within the digital space are extraordinarily diverse. The conditions on the crowdwork platform are defined by the platform provider, establishing algorithmic management methods, incorporating services as well as designing the user-interface. Furthermore, the process of labor supply and demand is managed by the platform provider through different models. For instance, work is offered on the platform by clients, launching contests, for which the crowdworker must send the finished work to apply for it, while the client may choose the best work from all applications (Gegenhuber, 2021). While there are platforms that offer the service of finding the right crowdworker for the client, others do not assist the client in any way. Moreover, there are platforms that recommend crowdworkers to the client by using algorithmic recommendation systems which get their data from the crowdworker's profile (Dunn, 2018; Gerber, 2020a). Thus, the conditions on the platform set the boundaries for work on the platform to which the crowdworkers must adapt.

Among many other platform functions, there are built-in payment services, file-sharing systems, chat functions, or special search engine functions. Furthermore, the platforms' policies define how violations by crowdworkers and clients are punished. Hence, the detection of violations through algorithms represents a challenge for crowdworkers. The platform conditions as well as their scope attract different types of clients and different crowdworkers with specific educational backgrounds. While some platforms focus on software development, others focus on creative design, and others again focus on different job durations or complexity. Also, some platforms work only on mobile devices or offer both options (e.g., Dunn, 2018; Graham et al., 2020).

Furthermore, societal, and cultural factors shape how work is valued and organized (Billett, 2014). Thus, sociocultural aspects play a vital role in the creation of learning opportunities, fundamentally shaping the workplace of crowdworkers (van der Zwet et al., 2011). Billet's workplace curriculum model is used "to make full use of the learning available through everyday participation in work activities guided by expert coworkers and assisted by the contributions of other workers and the workplace environment itself" (Billett, 2020, p. 1). Although in educational science the term curriculum normally refers to a codified and externally defined plan of learning goals within educational settings, in this study the term is understood as a model that grasps workplace learning as stated by Billet (2020). Therefore, a key principle is that learning and work occur simultaneously in a variety of instances.

The CPSS meta-model by Yilma et al. (2021) in combination with the workplace curriculum leads to the assumption that the relationship between the crowdworking platform as a cyber-social-system and humans is not only triangular but is shaped by many different constituents.

Especially for the crowdworkers' workplace, the use of crowdworking platforms through a digital device is a constraint. Therefore, the infrastructure of the workplace, the efficiency, and compatibility of the hardware resources of the cyber-physical-system (e.g., processor, display, peripheral devices) must be considered, as they may cause a digital divide between crowdworkers if software capabilities cannot be utilized due to hardware requirements not being met. This becomes important because people are only capable of accessing crowdworking platforms if using a digital device (a cyber-physical-system). This has tremendous consequences for the perspective toward the epistemologies of crowdworkers considering their capacities, subjectivity, and work agency. Capacities are a considerable dimension of this study because they allow the individual to participate in practice settings that require certain abilities, skills, and knowledge. Moreover, the study of subjectivity allows for the recognition of learning as a production of subjective senses and, therefore, seeks to understand the development of learning processes (Bezerra, 2016). Furthermore, goal-directed activities at the workplace foster workplace learning and are therefore another considerable dimension. Considering the work agency definition by Eteläpelto et al. (2013), Goller (2017) defines work agency as an individual characteristic that allows humans to engage in agentic actions such as deliberately pursuing learning and developmental activities as well as the tendency to shape one's own career or the tendency to make a difference in current work practices (e.g., to transform work practices).

While agentic actions are defined by human cognitive processes, the actions of cyber-social-systems such as crowdworking platforms are defined by their algorithms. Therefore, they shape the processes and conditions within the platform and restrict the crowdworker's space to deliberately pursue agentic actions on the crowdworking platform. For example, a crowdworking platform lists the most relevant and highest rated crowdworkers on top to satisfy the crowdworkers' clients and therefore to pursue the goal of attracting as many clients as possible. Those processes could be interpreted as the crowdworking-platform's cyber agentic actions because these actions can be seen as all kinds of algorithm-initiated and goal-directed processes that aim to take control over the platform environment or the user's cyber work-related processes (Berberian et al., 2012; Goller, 2017; Limerick et al., 2014) (Note 1). Following an interrelational logic, the crowdworking-platform itself can be seen as a learning organization trying to transform the platform environment, influencing work processes to maintain the profitability of the platform model, which results in consequences for the crowdworkers (Downes, 2022). In this study, those cyber agentic actions are described as algorithmic management methods. These algorithmic management methods are developed by the platform provider writing the platform's algorithms (e.g., ranking systems). Thus, algorithmic management methods must be considered for describing the processes of the platform.

Hence, the crowdworkers must adapt to the platform conditions. This adaptation to platform conditions can be seen as a goal-directed activity and therefore fosters workplace learning because they must learn how to participate in cyber practice settings such as the crowdworking platform and interrelated forums. Billett (2014) draws attention to the centrality of personal epistemological acts of those who are learning through mimesis (e.g., observing and imitation), listening, and actively engaging in work tasks and interactions. From an anthropological perspective, learners have a responsibility for their own learning. Individual epistemologies are essential for learners to engage in construing and constructing knowledge from what they experience when engaged in activities such as work. Epistemologies are more than beliefs (i.e., values and intentions) because they include the capacities of individuals, including their ways of knowing and the way they engage in activities. Essentially, they must learn how to participate in practice settings and learn effectively through and from them (Billett, 2008, 2014).

Additionally, the work on a task itself represents a challenge and offers learning opportunities when skill trades must be leveraged or new skill trades must be acquired to fulfill a task. Hence, crowdworkers engage in learning opportunities as soon as they are willing and able to cope with the challenges, using their resources by performing agentic actions. The transformation of challenges into learning opportunities depends on using the crowdworkers' resources (e.g., educational backgrounds, space for discussions, social support as well as mentorship, knowledge, experiences, capacities, and skills). Those resources can be accessed by connecting to, for instance, online communities (Downes, 2022; Siemens, 2017).

Within those online communities such as forums they participate in collaborative learning activities, sharing their learning experiences to cope with the challenges posed to them by the crowdworking platform. Thus, social interactions are a considerable dimension of workplace learning practices in crowdwork. Most crowdworkers participate in collaborative learning activities, sharing their learning experiences. Therefore, sociality and cooperation are as much a feature of crowdworkers' learning practices as they are at traditional workplaces (Billett, 2008; Eraut, 2007; Gray, 2004; Gupta, 2017; Margaryan, 2019; Martin et al., 2016). In this sense, they are

responsible for their learning when construing and constructing their knowledge from what they experience when engaging in such work activities (Billett, 2014).

2. Research Question

The complex workplace environment of crowdwork and the everyday participation in work activities raise the research question "Which learning opportunities are offered by the crowdworkers' workplace?" Three sub-questions derive from the theoretical framework for answering the main research question:

- Which constituents shape the crowdworkers' workplace?
- Which agentic actions do crowdworkers perform at their workplace?
- Which subjectivities do crowdworkers have?

These research questions aim to reconstruct the workplace of crowdworkers by identifying the workplace constituents as well as agentic actions and are meant for understanding the interactions between them. Additionally, they seek to identify the factors perceived as challenges at their workplace through the crowdworkers' subjectivities.

3. Methodology

The methodology of collecting data and synthesizing new knowledge follows the approach described by Torraco (2016). This approach for writing a systematic review is considered advantageous because it represents a distinctive form of research that makes use of existing literature to create new knowledge. Torraco emphasizes that those reviews do more than summarize existing research; they also develop new perspectives and assess future research directions. Therefore, since there is no established framework for identifying learning opportunities within digital working environments through a systematic review, this review considers the complete scientific cycle of knowledge generation to identify learning opportunities:

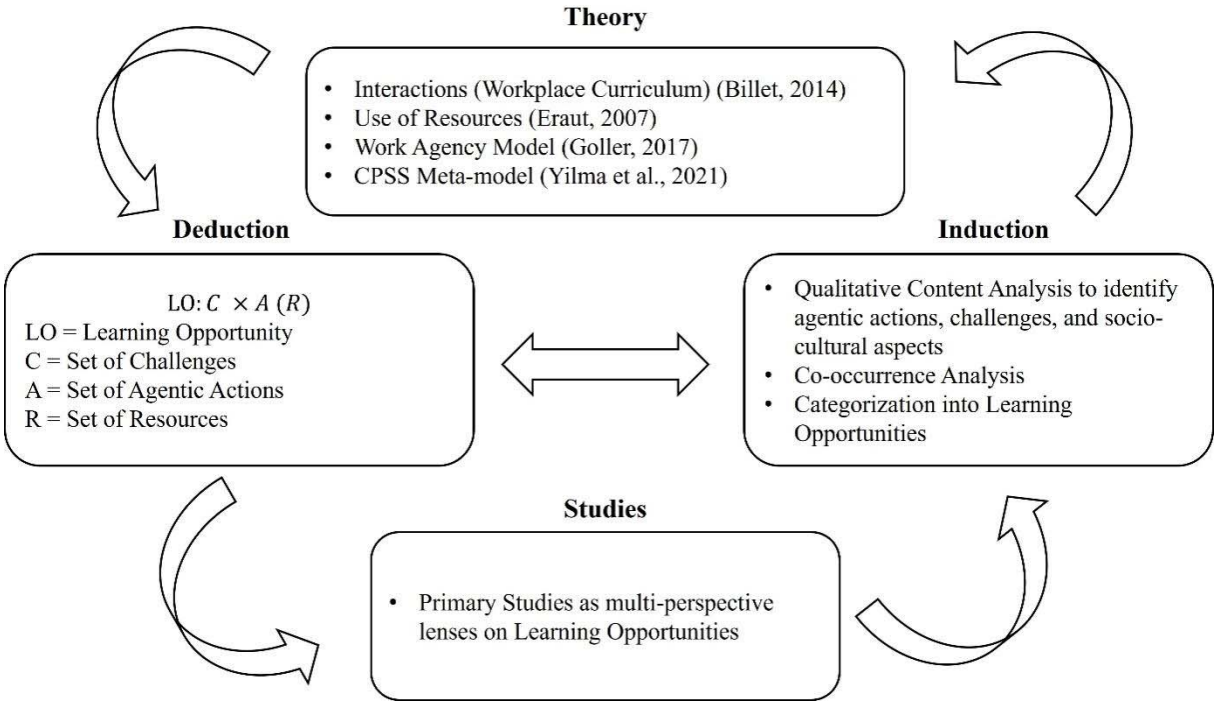

Figure 1. Knowledge Generation in this Systematic Review

From the theoretical framework it has been deduced how learning opportunities are found within the obtained studies for the systematic review. The analyzed primary studies are perceived as multi-perspective lenses on learning opportunities because they applied different methods, focus groups, and sample sizes with different research foci (see Appendix A). In the induction step, two methods were used to identify learning opportunities:

(1) qualitative content analysis (QCA) and (2) co-occurrence analysis. The co-occurrence analysis helps identify the relationships between learning opportunities and workplace constituents based on their frequency of appearing together within the analyzed studies. Terms or concepts that co-occur frequently are likely to be related or have some association, providing insights into the underlying connections between different topics (Zhou et al., 2022). Therefore, the researchers could gain valuable insights into the structure and dynamics of information associated with learning opportunities. Within the QCA, the studies were analyzed in the following manner to identify learning opportunities (Figure 2).

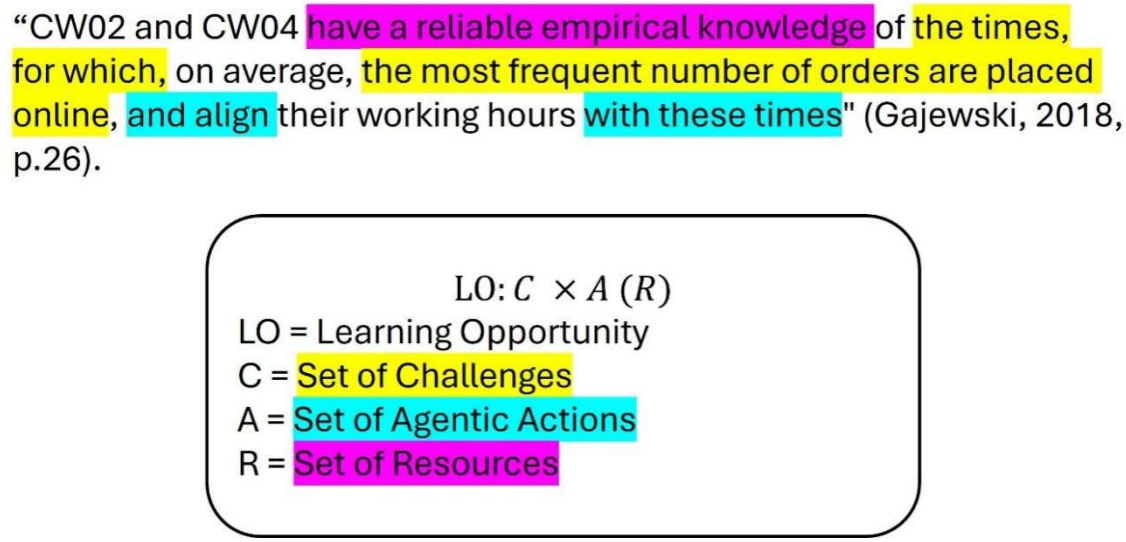

Figure 2. Exemplarily Identifying Learning Opportunities within the Studies

Exemplarily, a learning opportunity for understanding market interdependencies is identified in the study by Gajewski (2018). The qualitative content analysis using Atlas.ti 22 began with deductive categories such as agentic actions, subjectivities, and workplace constituents within the workplace environment framework, considering the cyber-physical-social system and its subsystems where challenges arise. Inductive categories were then derived from these deductive categories while learning opportunities stemmed from the co-occurrence of agentic actions, resources, and challenges within the crowdworking environment. Which workplace constituents contribute to the emergence of learning opportunities was also achieved through a co-occurrence analysis of both.

However, before the studies could be analyzed by using qualitative content analysis, the studies had to be obtained through various search engines. The first step was to generate relevant search strings. The selection of relevant search strings is based on the number of co-occurrences as well as on the scope those keywords imply. Figure 3 illustrates the keywords mentioned within the previously relevant identified literature to gain a previous understanding of crowdwork, counted by the software VOSviewer which is a tool to analyze scientific landscapes:

Figure 3. Keyword Co-Occurrence Map Pre-Understanding Literature Corpus

From this co-occurrence map, search string one (S_1) was identified, which resulted in the following relevant keywords: {crowdwork} and {gig work}. Secondly, literature from the search engines Scopus, BASE, ERIC, Springer Link, ArXiv, and Taylor & Francis was obtained, using S_1. Table 1 illustrates the number of search results obtained by help of S_1 for each search engine:

Table 1. Number of Search Results – Search String One (S_1)

Search Engines	Number of Results using Search String One (S1)
Scopus	233
BASE	93
ERIC	15
SpringerLink	33
ArXiv	83
Taylor & Francis	28
Total	485

Thirdly, by using a co-occurrence map from the literature obtained by help of search string one (S_1), the second search string (S_2) was generated. The keyword co-occurrence map led to a total of 7 relevant keywords for the second search string (S_2) to obtain the final literature corpus: {crowdwork}, {gig work}, {gig economy}, {algorithmic [platform] management}, {digital work platform}, {platform (work OR labor)}, {platform economy}.

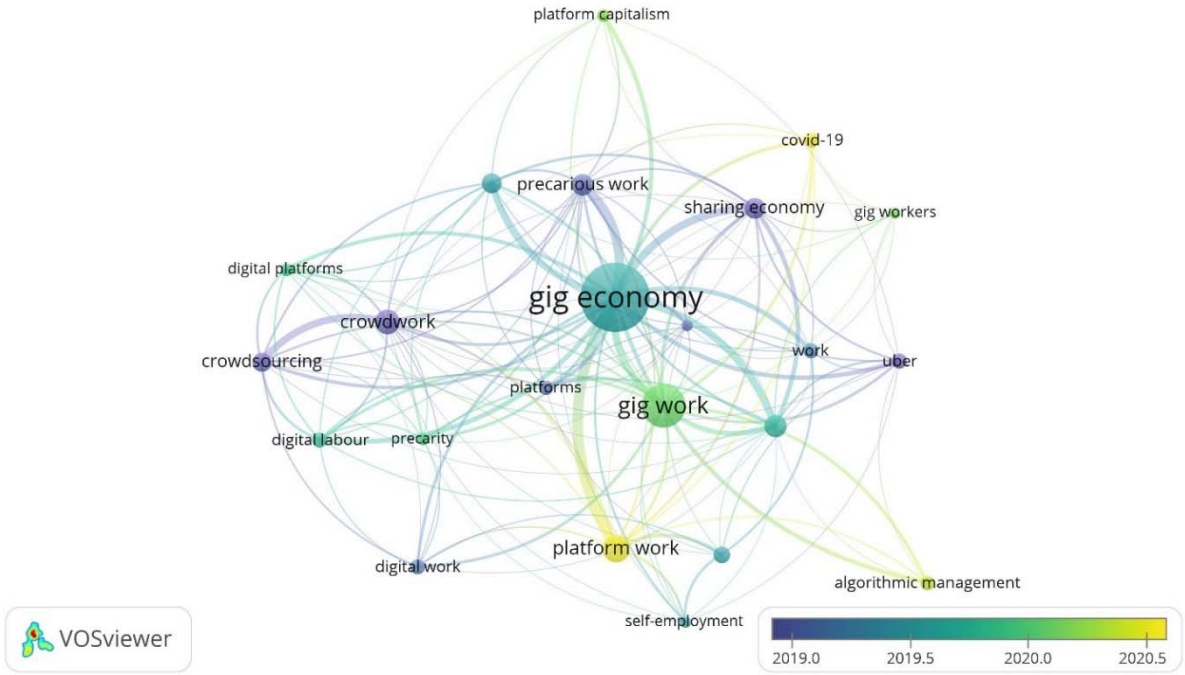

Figure 4. Keyword Co-Occurrence Map from S_1 Literature

Using the keyword search, relevant papers are identified and downloaded, using the Firefox Plugin Zotero. The keyword search is part of the first filtering step (F_1.Search) and includes criteria that describe meta-data. The second filtering step (F_2) refers to content-related criteria. Therefore, F_2 is more time-intensive and error-prone than filtering step F_1.Search because the text of the papers that passed the first filtering step must be analyzed through reading. Table 2 illustrates the inclusion and exclusion criteria for each filtering step:

Table 2. Filtering Steps and Inclusion Criteria

Filtering Step	Category	Inclusion Criteria	Exclusion Criteria
F_1.Search	Year	2011-2021	Non-English/ -German
	Language	English, German	Secondary Study
	Type of Study	Primary Studies	Full-Text not available
	Text Availability	Full-Text	
	Search String	Search String Two (S_2)	
F_2.TitleAbstract	Title, Abstract	Papers mentioning open challenges of crowdwork	Wrong scope (e.g., algorithm analysis)
		Papers mentioning aspects of crowdwork	
F_2.Content	Content	Papers linking workplace and crowdwork	Poor scientific standards
		Papers discussing open challenges of crowdwork	Purely theoretical
		Papers proposing solutions to crowdwork issues	Unclear target group
			Too short

After potentially relevant literature has been identified by using filtering step one (F_1.Search), the titles and abstracts are analyzed (F_2.TitleAbstract). The F_2.TitleAbstract filtering step makes use of the Python package ASReview v0.19 to screen large amounts of papers by hand while using machine learning algorithms to present the most relevant papers first (van de Schoot et al., 2021). If the downloading of full-texts and bibliographic meta-data via Zotero was not possible, the download was done manually on-site, incorporating the F_2.TitleAbstract filtering step. Subsequently, if the title and abstracts were relevant, the complete paper was read (F_2.Content). After reading the complete paper and after relevant content was identified, the paper was selected for final analysis by using the content analysis software *Atlas.ti 22*.

The following PRISMA diagram shows how many papers were identified and excluded and how many papers

passed each filtering step. Hence, it reveals the process of obtaining the final literature corpus number of 56 papers taken for final analysis to be included in the study (Figure 5).

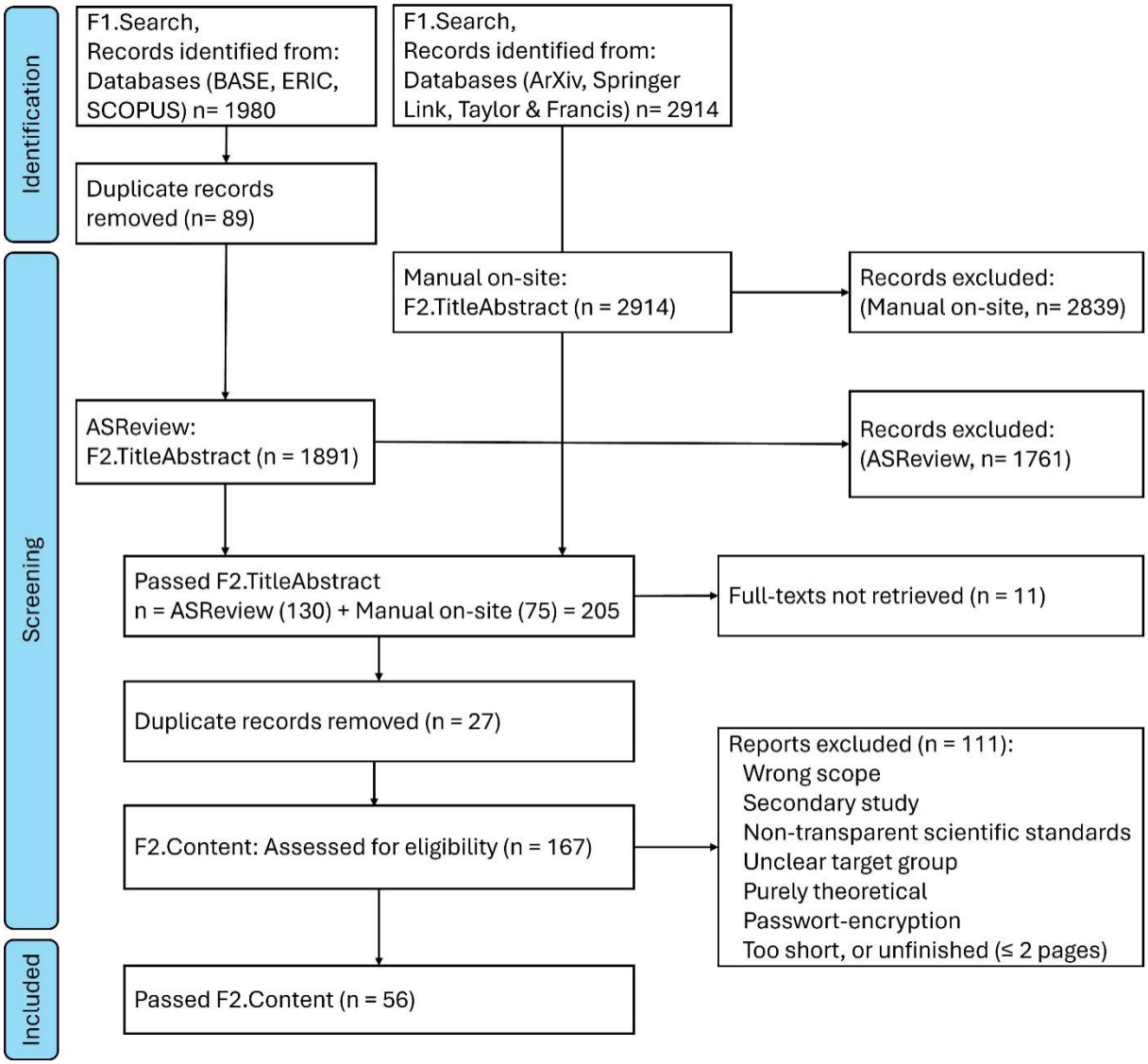

Figure 5. PRISMA diagram

4. Results and Discussion: Learning Opportunities

The self-organized nature of crowdwork demands high self-regulation skills. While organizing their work themselves, crowdworkers need to consider all constituents of their individual workplace environment. Considering educational backgrounds, Margaryan (2019) found that 86 percent of macroworkers report a university degree, whereas only 53 percent of microworkers do. Nevertheless, the studies agree that crowdworkers are often highly qualified individuals with bachelor's or higher degrees (e.g., Al-Ani, 2016; Anwar, 2020; Caza, 2021; Deng, 2016; Foong, 2018; Ihl, 2020; Rani, 2019; Wang, 2020). For instance, Wong (2021) and Newlands (2020) found that approx. 41–44 percent in the US have a bachelor's degree whereas in Asian countries such as India and China > 70 percent have at least a bachelor's degree (Newlands, 2020; Rani, 2019). Therefore, it should be highlighted that there exist regional as well as job type-related differences between formal education. Wang (2020) points out that on the macrowork platform *ZBJ.com* more complex tasks such as software development and industrial design are undertaken, demanding higher requirements. Especially for microtasks, crowdworkers with an educational background in Information Technology (IT) can automate parts of their work processes, such as

job search (Wood et al., 2019). Among crowdworkers without education in IT this agentic action has not been found. Hence, the level of digital literacy must be considered when engaging in learning opportunities and shaping work processes.

Often crowdworkers face multiple challenges, online and offline. While some do not find work in the local labor market and are forced to do crowdwork, others use it as a fun activity to distract themselves from ordinary work-life or to leverage their skills. Others are challenged by incorporating crowdwork into their lives, besides childcare and their main jobs (e.g., Wood et al., 2018; Idowu & Elbanna, 2021). Some crowdworkers, especially in developing and emerging countries, must even cope with infrastructural problems such as unstable Internet connections and power shortages. All these unique personal situations illustrate the diversity of crowdwork-life and the need to adapt to these diverse practice settings. Thus, their individualized learning path depends on multiple challenges that constitute workplace learning opportunities they engage with by performing agentic actions, considering self-regulative capacities.

The degree to which challenges occur is shaped by the crowdwork platform, the community interface, digital devices, and the individual workplace environment they encounter. Those challenges become learning opportunities when the crowdworkers engage with them by making use of their resources. Here the results suggest that sociocultural aspects such as family status, societal expectations, laws and regulations and infrastructure play a vital role within the crowdworkers' workplace, strongly shaping the crowdworkers' challenges. Individuals can engage in these learning opportunities as soon as they make use of the resources found either within these communities or in their educational background. These resources consist of knowledge, experiences, social support, recommendations of lucrative tasks, boosted profiles, practices, and work-patterns the crowdworkers can acquire. Also, they must independently engage with the communities of practice, using the community interface. Thus," work on platforms (…) becomes part of an individualised learning path for people who are continuously learning 'on the job'" (Al-Ani & Stumpp, 2016, p. 12).

There are instances of both, crowdworkers who engage with the community interface and those who do not. They can receive feedback, appreciation, and socialization depending on their capacity of making use of the community interface. Additionally, access to informal education is granted through the community interface, requiring high self-regulation capabilities to acquire self-taught new competencies. Crowdworkers can participate in designated learning opportunities when they deliberately engage with the community interface to understand crowdwork practices more thoroughly and draw from its resources by, for instance, taking online tutorials and mentoring. However, they can also experiment with all the learning opportunities of crowdwork, construing and constructing their understanding of crowdwork without the influence of the multi-perspectivity offered by the community interface (Hilkenmeier et al., 2021). Thus, a continuum exists between designated learning opportunities within those (online) communities of practice and challenge-based workplace learning opportunities.

The heatmap in Figure 6 illustrates the co-occurrences of learning opportunities and workplace constituents identified in the studies. The crowdworkers' workplace encompasses various socio-cultural areas, including locations, family, the local labor market, infrastructure, working hours, and expectations by society. Our study categorized learning opportunities according to six categories: using the community interface, using technology, dealing with self-regulation, managing crowdwork, understanding market interdependence, and building a brand. The co-occurrence analysis revealed very low coefficients (0.01) and higher coefficients (0.19). This indicates a spectrum of learning opportunities within different areas of the crowdworkers' workplace.

Learning Opportunities		Cyber-Social-Systems								Workplace Environment									
		Crowdworking Platform							Forums	CPS	Socioculture								
		Name and Scope	Platform Management	Profile	Provider	Internal Community	Client	Tasks	External Community	Hardware	Software	Location	Family	Local Labor Market	Other Job	Regulations and Social Welfare	Social Offline Networks	Societal Expectations	Technical Infrastructure	Time
Using Technology	Understanding User-Interfaces	0,01	0,01	0,06	0,01					0,02	0,06									
	Assessing Functionalities	0,02	0,03	0,03	0,05					0,01	0,03								0,01	
	Manipulating	0,01	0,06	0,05					0,01	0,01	0,03								0,02	
	Understanding Algorithms	0,01	0,01		0,01					0,01	0,03									
	Choosing Appropriate Hard- and Software		0,06	0,02	0,01					0,08	0,09								0,03	
Understanding Market Interdependencies	Labor Supply and Demand	0,03	0,06	0,08	0,01	0,02	0,09	0,05	0,01	0,03	0,03	0,04				0,01	0,03	0,03	0,02	0,05
	Platform Management and its Effects	0,01	0,06				0,02	0,05		0,01	0,03	0,01					0,01	0,01	0,02	0,05
	Importance of the Community and Networks	0,01			0,02	0,05	0,05	0,01	0,10	0,02			0,04				0,09			
Managing Work	Organizing Work Around Life		0,06	0,02	0,01			0,02					0,02				0,03	0,01		0,08
	Choosing Locations											0,06	0,01							
	Choosing Tasks and Clients					0,01	0,04	0,05	0,02			0,01								
	Administrating						0,02													
Community Interface	Engage in Community Building	0,02	0,03	0,03	0,05	0,08			0,19		0,03						0,09			
	Understanding Communication					0,06			0,11	0,01	0,02	0,01					0,04			
	Assessing and Using Community Resources					0,02	0,01		0,10		0,01		0,04				0,06	0,01	0,01	0,01
Building a Brand	Self-Presentation	0,01	0,01	0,06	0,01	0,01		0,01	0,07	0,02	0,06	0,01	0,01		0,01	0,01	0,04	0,03		0,03
	Building Relationships with Clients						0,06	0,01	0,01			0,01		0,01				0,04		0,02
	Building a Reputation	0,01	0,03	0,05		0,01	0,05	0,01	0,02		0,01	0,01	0,01				0,01			0,07
Self-Regulation	Informal Learning (Engaging in LO)	0,01	0,01		0,01	0,01			0,04	0,01	0,03						0,02			
	Self-Reflection						0,01		0,01								0,01	0,04		
	Self-Discipline						0,01	0,02	0,01				0,06		0,02				0,02	0,03
	Motivation						0,01	0,02	0,01	0,01	0,01	0,07	0,06	0,06	0,02		0,02	0,01	0,01	0,03
	Developing a Crowdwork Identity						0,01	0,03												

Figure 6. Co-Occurrence Heatmap of Learning Opportunities within the Crowdworkers' Workplace

The crowdworkers' learning opportunities will be described in each section. All studies that support each aspect of the identified learning opportunities are to be found in Appendix B.

4.1 Using Technology

The digital space presents a variety of challenges to the crowdworkers, considering its cyber-physical-systems, including hardware and software, as well as its cyber-social-systems and the expansion of the Internet. Considering the hard- and software (CPS) functions of digital devices, crowdworkers must evaluate and choose the appropriate equipment for each respective task, depending on the client's expectations and individual preferences (Anwar & Graham, 2020, 2021; Newlands & Lutz, 2020; Bellesia et al., 2019; Williams et al., 2019). Hence, they must assess the functionalities of both, the platform, and the digital device. In cyber-social-systems, for instance, the characteristics of the platform's search engine have to be considered: for example, whether it is possible to search for both, tasks and clients (Deng et al., 2016). Also, the crowdworkers need to ask themselves which functions the platform offers to support the payment process between crowdworkers and clients (Jarrahi et al., 2020).

Moreover, it is important to understand the user-interface to be able to use all offered functionalities. The algorithmic processes involved in algorithmic management and the collected data are not made transparent by platform providers. Therefore, the black-box phenomenon is created and the crowdworkers do not know how the algorithm works and what its outcomes are (Moore & Joyce, 2019; Rudin & Radin, 2019). For instance, when crowdworkers get a negative rating, many informants observed that they did not receive as many jobs as before the bad rating.

Although they do not know what is happening within the black-box, they find out how to manipulate the algorithm by feeding it favorable data, receiving a hint at which outcomes the algorithm creates. Jarrahi and Sutherland (2019) point out that algorithmic competency is crucial for key practices in the context of crowdwork. Here, the development of digital literacy plays a vital role. Through engagement with real-world algorithmic management the crowdworkers are provided with diverse experiences that encourage them to find solutions, because they are contributing to the larger crowdwork community, securing their income, and promoting commitment to crowdwork (Ridsdale et al., 2016).

Furthermore, crowdworkers are challenged by the development of adequate mental models that reconstruct the algorithm and its effects (Harteis, 2022; Harteis et al., 2020). There, experimenting with the algorithm is an important practice that can be described as engagement in workplace learning (Hilkenmeier et al., 2021). This kind of learning is driven by the crowdworkers' aim to tackle algorithmic scrutiny. While doing administrative tasks, they must choose between multiple tools to document their work processes. There is the option to use analog tools,

like calendars and notebooks, or digital tools such as MS Word or Google Sheets. The co-occurrence analysis suggests that most learning opportunities in the context of using technology co-occur with cyber-physical systems (CPS) (coeff. = 0.02 to 0.09), and with the crowdworking platform (coeff. = 0.01 to 0.06). Additionally, the technological infrastructure appears to provide opportunities for learning (coeff. = 0.01 to 0.03), since crowdwork depends on it (e.g., a computer, electricity, an Internet connection) and consequently has the potential to change work experiences (Anwar & Graham, 2021).

4.2 Understanding Market Interdependence

The understanding of market interdependence describes the meta-perspective on crowdwork and how the work-related processes influence the challenges faced by crowdworkers, depending on the platforms they use, the clients they interact with, and their individual workplace environment.

Learning opportunities also occur when evaluating different tasks, clients, and platforms, comparing market processes to agentic actions and their sociocultural-spacetime, including, for instance, working hours, family life, and digital devices. Nevertheless, it is in the individual's responsibility to develop a mental model of market interdependence to better understand the reality of crowdwork (Harteis, 2022). This mental model should grasp the interdependence of crowdwork from a meta-perspective. Moreover, the complexity of this mental model is dependent on the individual's capacities as well as on the activity of learning. Hence, the crowdworker can either experiment with market interdependence or engage with the community interface and use its resources to get an overview of market interdependence through the multiple perspectives of others. For instance, when the crowdworker understands that a certain task is posted at a certain time in the week or on the day because the client works in another time zone, interdependence within crowdwork becomes present, likewise the seasonality of tasks.

As soon as crowdworkers register on multiple platforms, they recognize which tasks are posted on which platform at which point in time. Moreover, rates for financial remuneration are very distinct throughout the diversity of crowdwork, depending on the task type as well as on the platform and the countries the fellow crowdworkers are from. Then, they must assess which rate to charge for their work. The effects of negative reviews and ratings become present when the algorithm calculates the job success score, lowering the platform's reputation, and decreasing the probability of getting jobs (Sutherland et al., 2020; Wood et al., 2019)

The co-occurrence analysis reveals that most learning opportunities are found within external online forums (coeff. = 0.10), social offline networks (coeff. = 0.03 to 0.09), the client (coeff. = 0.02 to 0.09), and their profile on the crowdworking platform (coeff. = 0.08). Once they understand that the community interface is a great resource that offers knowledge, experiences, appreciation, and resources such as recommendations of lucrative tasks and boosted profiles for sale, crowdworkers begin to be guided by the community. Then they begin to make use of these resources, engaging in discussions, mentoring, and sharing stories and knowledge and therefore leverage their work practices and understanding of the interdependence within crowdwork (Wood et al., 2018, 2019; Anwar & Graham, 2020; Sutherland et al., 2020; Rani & Furrer, 2021; Ihl et al., 2020). They perceive multiple perspectives on best practices, recommendations of hardware and software, as well as the effects of algorithms and how they can be manipulated. Furthermore, personal networks can help them outsource work or engage in collaborative activities.

4.3 Managing Crowdwork

Learning opportunities occur when work processes must be managed, for instance, when project deadlines must be met and, consequently, must be documented in a calendar or notebook (Sutherland et al., 2020; Williams et al., 2019). With this example the capacity to plan and organize work to meet the deadline and use the calendar or notebook represents a resource. When the crowdworker makes use of these resources, the challenge becomes a learning opportunity.

Personal circumstances, like childcare and other responsibilities such as further work obligations, shape the crowdworkers' time resources. Not only momentary time resources but also infrastructural conditions as well as career aspirations must be considered when choosing tasks and clients to work with and locations to work from (e.g., Deng & Joshi, 2016; Gajewski, 2018). For instance, choosing the wrong client could lead to negative feedback and consequently affect one's reputation on the platform and therefore the probability to get jobs.

Additionally, administrative tasks could be necessary for payment, when logging unfulfilled payments and completed jobs as well as documenting active projects (Williams et al., 2019). Thus, administrative tasks serve to secure remuneration and the planning of future jobs. Then they must manage their use of time and choose tasks that meet their time resources. Instead of searching for jobs for a long time, they often favor repetitive tasks with high availability (Lehdonvirta, 2018). The co-occurring of learning opportunities with aspects related to time, such

as working hours or time to finish tasks, supports these findings (coeff. = 0.08).

Likewise, infrastructural conditions must be considered because of the nature of crowdwork that requires an Internet connection. The co-occurrence analysis supports this finding as learning opportunities co-occur with tasks (coeff. = 0.05), clients (coeff. = 0.04), and locations (coeff. = 0.06). Hence, these factors must be chosen wisely, based on their characteristics to avoid lowering the career potential. Therefore, they need to develop solutions to those challenges if necessary (e.g., circumventing power shortages with solar panels). They do this by considering their understanding of market interdependence in the context of crowdwork.

4.4 Using the Online and Offline Community Interface

The offline and online community is a great social support for crowdworkers and helps them grasp the nature of crowdwork and navigate insecure and non-transparent work relations. Digital interactions are documented within online communities, such as Facebook, Reddit, and other social media.

They discuss and support each other by sharing resources and mentoring each other. For instance, they advise one to go to bed and take care of oneself or offer solutions to software problems. Moreover, they participate in community building and ask for advice on issues. Additionally, they collaborate on jobs, share stories, and socialize, online and offline. By passing on their knowledge, they train beginners. Furthermore, the support of special networks can be crucial for career development because they are used to boost profiles or win contests on platforms like *Designenlassen.de* that organize the distribution of jobs through contests (M. Anwar & Graham, 2020; Gegenhuber et al., 2018; Gerber, 2020a; Gerber & Krzywdzinski, 2019; Idowu & Elbanna, 2020; A. Wood et al., 2018).

Therefore, those cyber-social-systems are a great resource for crowdworkers to deal with issues and gain secondary experience from others to adopt or change those practices in their agentic actions. Firstly, they are challenged to understand how to interact with the community by sharing experiences, knowledge, and resources, as well as posting comments and questions, and agreeing to the forum's terms of conduct (e.g., Soriano & Cabañes, 2020; Wood et al., 2018; Gerber & Krzywdzinski, 2019; Gerber et al., 2020a; Al-Ani & Stumpp, 2016; Blyth, 2019). Secondly, they are challenged to find the necessary information within the digital space, using Google and other search engines for the suitable online community forum. Thirdly, there is the challenge of drawing implications from the aspects that have been discussed within the communities. The multitude of perspectives and mentoring practices within the community can be interpreted as instructional content (Elliott & Bartlett, 2016). Although, the community does not teach explicitly and the crowdworkers are free to decide how far they engage with the community and how much time they spend on community interactions, such as mentoring or advising. Thus, the crowdworkers' deliberate engagement with the community interface, to develop skills and gain a deeper understanding of the reality of crowdwork, represents a designated learning opportunity (Hilkenmeier et al., 2021). The co-occurrence analysis supports the findings that learning opportunities often co-occur with the external online community (coeff. = 0.10 to 0.19), the social offline network (coeff. = 0.04 to 0.09), and the internal crowdworking platform community (coeff. = 0.02 to 0.08). Hence, this systematic review notes that the community provides the learning opportunity to gain insight into multiple new perspectives on crowdwork challenges, issues, practices as well as private life, and therefore to grasp the reality of crowdwork more thoroughly and provide social support to the crowdworker. There they find best practice recommendations and can decide to either adopt those practices or forfeit them. Moreover, they find recommendations concerning clients and lucrative tasks. Thus, crowdworkers are guided by the crowd as soon as they engage with the community interface.

4.5 Building a Brand

In the context of the challenges of increasing reputation, building relationships with clients, forming networks, and working from different places such as co-working spaces, there occurs the learning opportunity of building a brand. The co-occurrence analysis suggests that learning opportunities co-occur with the external online community (coeff. = 0.07), the crowdworking profile, the client, software, and time (equal coeff. = max. 0.06).

Self-presentation on the platform as well as on social media is a requirement for getting jobs. While at the beginning of their crowdwork career they do as many jobs as possible with low remuneration, with growing experience they develop their own brand. This brand should be congruent with their skill trades and crowdwork identity (Sutherland et al., 2020). They can either participate in designated learning opportunities by engaging with the community and drawing information about brand building from the community interface, or they can experiment with building their brand through trial and error, evaluating the effects of a certain agentic action on their reputation and social media reach, as well as their reach on crowdworking platforms. To protect their brand, they need to make use of the multiple resources within their range, using negotiation skills as well as personal networks, platform services, legal advice, and unions (Schörpf et al., 2017; Blyth, 2019; Sevchuck et al., 2021;

Bucher et al., 2021).

With increasing reputation they are also able to build relationships with clients more easily, even establishing relationships outside the platform and therefore extending their presence outside the platform, using different locations (Aleksynska et al., 2019; Dunn, 2018; Elbanna & Idowu, 2021; Idowu & Elbanna, 2020). Or vice versa, crowdwork can serve as an extension of the work outside the platform, making it a subsidiary income source (e.g., Blyth, 2019). In both scenarios, self-presentation and the use of different locations play a vital role because the crowdworkers' presentations online, on social media, on their own websites, and on community forums help them increase their reputation, and therefore they get access to more jobs and clients. Thus, as their brand and reputation grow, they get exposed to more challenges, online and offline. Pajarinen (2018) points out that higher education is positively correlated with work autonomy, for instance, the ability to decide about one's own prices. Most crowdworkers have no previous independent work experience when starting crowdwork, neither offline nor online (e.g., Idowu & Elbanna, 2021a). Thus, the challenge of building their own brand is likely unknown to crowdwork beginners. Therefore, they must make use of their resources to master this challenge.

4.6 Dealing with Self-Regulation

Using technology as well as learning through and about it requires high self-regulation capacities that either must be developed or are already there, depending on the individual's prior experiences. Hence, experimenting with algorithms and observing the effects of one's actions is highly dependent on self-regulation capacities, including self-reflection and self-organization, because it does not follow any curriculum (Harteis, 2022).

Due to the harsh nature of crowdwork, they are challenged to develop a crowdworker identity to cope with those challenges, for instance by seeing themselves as being self-employed, as most crowdworkers do, and consequently even by institutionalizing their crowdworking activity as a crowdwork business (Idowu & Elbanna, 2021). The co-occurrence analysis supports this finding, since learning opportunities to develop a crowdwork identity co-occur with tasks and clients (coeff. = 0.01 to 0.03). Crowdworkers feel pressured by the feeling that they always need to be online to get lucrative jobs (Shevchuk et al., 2021), which supports that the opportunity to learn self-discipline co-occurs with time related aspects (coeff. = 0.03). Wang et al. (2020) noted that the use of complex equipment for crowdwork tasks, such as multi-monitoring, leads to exhaustion. Hence, self-organization plays a major role in planning periods of relaxation and managing the work-life balance. Thus, self-discipline is not only required to engage in work activities, but it is also needed to rest and take care of oneself at the right time (Ho et al., 2015). Otherwise, stress and exhaustion can lead to severe health problems (Wang et al., 2020).

To stay motivated, crowdworkers must reflect on their individual preferences, considering task characteristics and other aspects of work, like social appreciation and meaningfulness. The learning opportunity to stay motivated is supported by the co-occurrence analysis that revealed co-occurrences with sociocultural aspects such as locations, family, and the local labor market (coeff. = 0.06 to 0.07). Consequently, it is their own responsibility to engage in those activities and choose tasks that meet their preferences considering these sociocultural aspects. Crowdworkers do not only engage in workplace learning that is driven by the crowdworkers' aim to tackle challenges they encounter, but they also participate in designated learning opportunities when they take part in online tutorials and online courses as well as community activities to "acquire a deeper understanding of work-related issues that might help to respond to new challenges beyond the immediate demands of the workplace" (Hilkenmeier et al., 2021, p. 414), like how to build a brand. It is the individual's own responsibility to engage in learning opportunities such as taking an online course or reading. Some crowdworkers start to do platform-based work because they want to leverage their skills (Hilkenmeier et al., 2021). There is the opportunity to learn how to cope with the challenges and issues of crowdwork, like emotionally or physically exploitative conditions (Schlicher et al., 2021; Wood et al., 2018; 2019; Lehdonvirta, 2018; Wang et al., 2020; Idowu & Elbana, 2021a; Caza et al., 2021; Soriano & Cabañes, 2020). Emotionally, workers could make use of the community interface to engage with the crowd and thereby adopt or avoid other people's practices, using strategies to keep emotionally stable.

Here, the individual him/herself must decide which strategy might be appropriate for him/her in the specific life situation. This finding corresponds to the findings by Margaryan et al. (2022) highlighting the importance of self-regulated learning strategies at the crowdworkers' workplace.

5. Conclusion

This systematic review contributes to the understanding of learning opportunities within the crowdworkers' workplace. The community interface provides access to multiple online and offline communities and provides the crowdworker with resources to engage with the challenges of crowdwork. These challenges become learning opportunities as soon as the crowdworkers make use of their resources. The resources available through the community interface include, for instance, space for discussions, social support as well as mentorship. Additionally,

they collaborate on jobs, share stories, and socialize online and offline. Furthermore, the support of special networks can be crucial for career development because they are used to boost profiles or win contests on platforms. Other resources like knowledge, skills, personal networks, platform services, legal advice, and unions, allow crowdworkers to engage in these learning opportunities deliberately and freely. Hence, it is emphasized that self-regulation capabilities play an important role when engaging in learning opportunities. Figure 7 summarizes the potential learning opportunities and gives an overview of the crowdworkers' workplace:

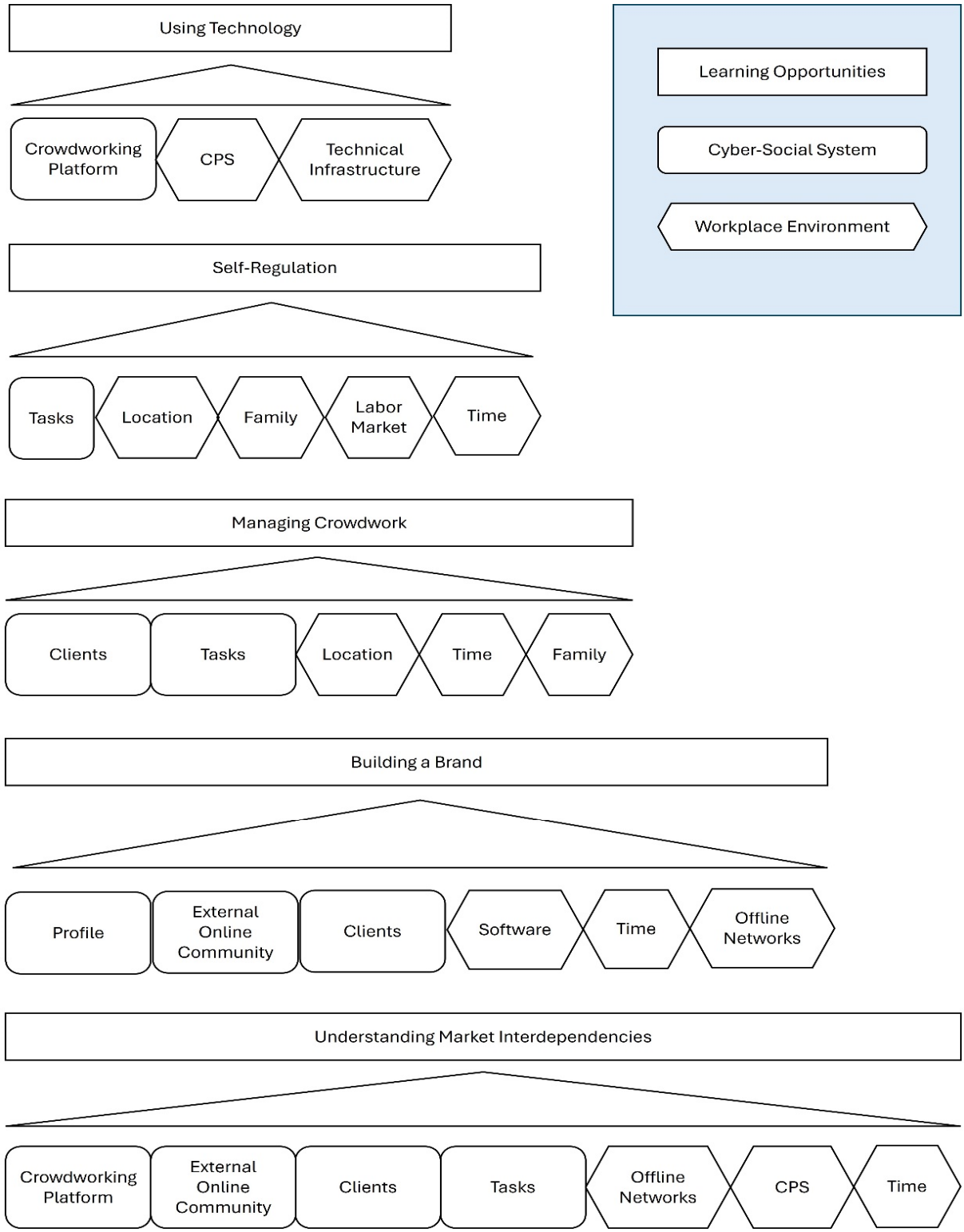

Figure 7. Summary of the Learning Opportunities within the Crowdworkers' Workplace

Although crowdworkers are flexible in organizing their workday, they are bound to the conditions of crowdwork, such as the seasonality of work, the platform, and the features of clients. Hence, it is crucial for future crowdworkers that governments and platform providers as well as researchers foster the educational development of crowdworkers. For instance, a scientific best practice guide to foster the crowdworkers' education and their preparation for the challenging nature of crowdwork could be developed.

Throughout our study it could not be identified to which extent the crowdwork platform functionalities shape the occurrence of learning opportunities, because the text data was not specific enough. It has only been found that platform functionalities and conditions influence crowdworkers' agentic actions and subjectivities. Thus, future research should investigate the influence of platform functionalities and conditions on the occurrence of learning opportunities in more detail. The question of the role of mental models remains and therefore requires future research. Such research should consider how mental models of algorithms and market interdependence are constructed and how this process can be supported.

Although Posch et al. (2019) found that user-interface design was perceived as being clear in most countries, the question of digital literacy among crowdworkers arises and how it is connected to engaging in learning opportunities. Does crowdwork require a minimum digital literacy to participate in it? Do crowdworkers acquire digital literacy in the sense of learning by doing? Which levels of digital literacy reduce learning opportunities?

To which extent the crowdworker can engage with the community depends on his/her capabilities, experiences, and subjectivities and should be investigated by further studies. Wood et al. (2018) note that digital communication is more common in African countries. For research it would also be interesting to verify if digital communication among crowdworkers is more apparent in developing countries than in developed countries and how this engagement influences their learning within groups.

Furthermore, the capacity to participate in a certain task type and task area is highly dependent on the skill trades the crowdworkers develop or have already acquired throughout their crowdwork career. Hence, former education has also to be considered when identifying learning needs in the context of further research. How do crowdworkers differ in their capacities according to their formal education and life courses? Considering those capacities, which tasks can they perform, and how do they differ in their agentic actions? Consequently, with research findings about the crowdworkers' capacities and their highly individualized learning paths, their learning needs for crowdwork could be assessed. Thus, the investigation of these learning paths should incorporate digital literacy and educational backgrounds, too.

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Authors' contributions

Stephan Drechsler was responsible for study design, data collection and data analysis. Stephan Drechsler was responsible for drafting the manuscript. Stephan Drechsler and Prof. Christian Harteis were responsible for revising the manuscript. Prof. Christian Harteis was responsible for supervising the whole research process. All authors read and approved the final manuscript.

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Notes

Note 1. The definition is inspired by the definition of (human) agentic actions by Goller (2017).

Appendix A

Table A1. Summary of Research Methods in Sample Studies

Research Methods	Sample Studies	Example
Quantitative (surveys and questionnaires) (14)	Ihl (2020) Wong (2020, 201) Wang (2020) Margaryan (2016, 2019) Schlicher (2021) Caza (2021) Newlands (2020) Pajarinen (2018) Posch (2018, 2019) Durward (2020) Aleksynska (2019)	"All were measured on a seven-point Likert scale (…)" (Ihl, 2020, p.24)
Interview study (semi-structured, structured, group discussion) (12)	Williams (2019) Schörpf (2017) Wood (2019, 2018) Gajewski (2018) Anwar (2020, 2021) Dunn (2018) Blyth (2019) Bäckegren (2021) Oelsnitz (2020) Lehdonvirta (2018)	"Each interview was scheduled to last 30 minutes." (William, 2019, p.5)
Qualitative survey (3)	Deng (2016a, 2016b) Fieseler (2019)	"The respondents responded to the questions in writing. In addition, we collected demographic information related to respondents' household income, employment status" (Deng, 2016a, p.654).
Window switching measurement; online Tests (HITs); Online profile analysis Knowledge, Skills, Abilities (KSAs), Photo, Reviews Platform activity analysis (contests and profiles) Platform data (bill rates and names for gender) (7)	Gould (2016) Galperin (2021) Carr (2017) Shevchuk (2021) Foong (2018) Ho (2015, 2018)	"We used a method that tracks participants' multitasking behavior using only the browser window (…)" (Gould, 2016, p.4)
Mixed method study (e.g., interview and survey; social media data and document analysis; ethnographic online observation and interviews; survey and essay data; document analysis and interviews; interviews and forum discussions) (20)	Al-Ani (2016) Rani (2019, 2021) Idowu & Elbanna (2020, 2021a, 2021): Elbanna & Idowu (2021) Sutherland (2020) Soriano (2020) Kinder (2019) Bucher (2019, 2021) Bellesia (2019) Gerber (2019, 2020a, 2020b) Jarrahi (2019, 2020) Gegenhuber (2018, 2021)	"explorative two-step process, which is composed of expert interviews in the form of a workshop and a quantitative online survey" (Al-Ani, 2016, p. 5). "policy and help documents published by Upwork, semi-structured interviews (…) and direct observation of the website" (Sutherland, 2020, p. 461). "FAQs, blogs, as well as overviews of forum threads (…) newsletters and informational emails" (Gegenhuber, 2021, p.1481)

Appendix B

Table B1. Using Technology as a Learning Opportunity

Learning Opportunity		Studies
Using Technology	Choosing appropriate hard- and software	Anwar & Graham (2021), Newlands & Lutz (2020), Bellesia et al. (2019), Anwar & Graham (2020), Williams et al. (2019)
	Assessing functionalities	Sutherland et al. (2020), Gerber (2020b), Dunn (2018), Williams et al. (2019), Lehdonvirta (2018), Gegenhuber et al. (2018), Deng et al. (2016)
	Understanding user-interfaces	Jarrahi & Sutherland (2019), Gegenhuber et al. (2018), Bellesia et al. (2019)
	Manipulating	Jarrahi & Sutherland (2019), Jarrahi et al. (2020)
	Understanding algorithms	Bucher et al. (2021), Kinder et al. (2019), Bellesia et al. (2019), Gerber & Krzywdzinski (2019), Idowu & Elbanna (2021), Jarrahi et al. (2020), Elbanna & Idowu (2021)

Table B2. Understanding Market Interdependence as a Learning Opportunity

Learning Opportunity		Studies
Understanding Market Interdependencies	Labor supply and demand	Williams et al. (2019), Schörpf et al. (2017), Gould et al. (2016), Bellesia et al. (2019), Aleksynka et al. (2019), Anwar & Graham (2021), Gajewski (2018), Gerber (2020b)
	Platform management and its effects	Pajarinen et al. (2018), Bucher et al. (2021), Kinder et al. (2019), Rani & Furrer (2019, 2021), Gerber (2020b), Schörpf et al. (2017), Deng & Joshi (2016), Sutherland et al. (2020), Lehdonvirta (2018), Gajewski (2018), Wood et al. (2019), Blyth (2019), Idowu & Elbanna (2020), Galperin (2021)
	Importance of the community and personal networks	Wood et al. (2018, 2019), Anwar & Graham (2020), Sutherland et al. (2020), Rani & Furrer (2021), Ihl et al. (2020)

Table B3. Managing Crowdwork as a Learning Opportunity

Learning Opportunity		Studies
Managing Work	Organizing work around life	Sutherland et al. (2020), Williams et al. (2019), Schörpf et al. (2017), Gould et al. (2016), Al-Ani & Stumpp (2016), Rani & Furrer (2019), Anwar & Graham (2020), Idowu & Elbanna (2021), Wood et al. (2018), Foong et al. (2018)
	Choosing locations	Williams et al. (2019), Aleksynska et al. (2019), Al-Ani & Stumpp (2016), Idowu & Elbanna (2021), Bäckegren & Chalandon (2021)
	Planning work-day and career	Wang et al. (2020), Williams et al. (2019), Schörpf et al. (2017), Wood et al. (2019)
	Choosing tasks and clients	Jarrahi & Sutherland (2019), Williams et al. (2019), Gould et al. (2016), Lehdonvirta (2018), Wang et al. (2020), Deng et al. (2016)
	Administrating	Williams et al. (2019), Sutherland et al. (2020)

Table B4. Using the Community Interface as a Learning Opportunity

Learning Opportunity		Studies
Using the Community Interface	Engage in community building	Wood et al. (2018), Gerber (2020a), Gerber & Krzywdzinski (2019), Lehdonvirta (2018), Bucher et al. (2019), Elbanna and Idowu (2021), Jarrahi and Sutherland (2019), Gegenhuber et al. (2018), Fieseler et al. (2019), Ho & Yin (2018)
	Understanding communication	Lehdonvirta (2018), Gegenhuber et al. (2021), Williams et al. (2019), Soriano & Cabañes (2020), Kinder et al. (2019)
	Assessing and using community resources: knowledge, discussions, experiences, mentoring, appreciation, accounts etc.	Soriano & Cabañes (2020), Wood et al. (2018), Gerber & Krzywdzinski (2019), Gerber et al. (2020a), Al-Ani & Stumpp (2016), Blyth (2019), Anwar & Graham (2020), Bucher (2021), Kinder et al. (2019), Lehdonvirta (2018), Margaryan (2016, 2019), Elbanna and Idowu (2021), Aleksynska et al. (2019), Blyth (2019), Idowu & Elbanna (2020, 2021a)

Table B5. Building a Brand as a Learning Opportunity

Learning Opportunity		Studies
Building a Brand	Self-Presentation	Soriano & Cabañes (2020), Kinder et al. (2019), Wood et al. (2018), Gerber (2019, 2020a), Carr et al. (2017), Aleksynska et al. (2019), Blyth (2019), Idowu & Elbanna (2020, 2021), Jarrahi et al. (2020), Elbanna & Idowu (2021), Schörpf et al. (2017), Sevchuck et al. (2021), Bucher et al. (2021), Anwar & Graham (2021), Pajarinen et al. (2018)
	Building relationships with clients	Sutherland et al. (2020), Bucher et al. (2019), Bellesia et al. (2019), Wood et al. (2019), Gerber (2020a), Dunn (2018), Blyth (2019), Idowu & Elbanna (2020, 2021), Von der Oelsnitz (2020), Jarrahi et al. (2020), Elbanna & Idowu (2021)
	Using different locations	Aleksynska et al. (2019), Dunn (2018), Elbanna & Idowu (2021), Idowu & Elbanna (2020)

Table B6. Dealing with Self-Regulation as a Learning Opportunity

Learning Opportunity		Studies
Self-Regulation	Developing a crowdwork identity	Wong et al. (2021), Idowu & Elbanna (2020, 2021a), Newlands & Lutz (2020), Elbanna & Idowu (2021), Bellesia et al. (2019)
	Being self-disciplined	Wang et al. (2020), Williams et al. (2019), Al-Ani & Stumpp (2016), Deng & Joshi (2016), Rani & Furrer (2019, 2021), Anwar & Graham (2020), Schlicher et al. (2021), Bucher et al. (2019), Foong et al. (2018), Ho et al. (2015)
	Self-reflection	Soriano & Cabañes (2020), Wang et al. (2020), Jarrahi et al. (2020) Idowu & Elbanna (2021a), Margaryan (2016)
	Coping with challenges (e.g., uncertainty and issues)	Schlicher et al. (2021), Wood et al. (2018, 2019), Lehdonvirta (2018) Wang et al. (2020), Idowu & Elbana (2021a), Caza et al. (2021) Soriano & Cabañes (2020)
	Mimic or avoid others' practices	Margaryan (2019), Soriano & Cabañes (2020), Gerber (2020a), Jarrahi & Sutherland (2019)
	Motivation	Schörpf et al. (2017), Al-Ani & Stumpp (2016), Deng & Joshi (2016) Rani & Furrer (2019, 2021), Anwar & Graham (2020, 2021), Bellesia et al. (2019), Wood et al. (2019), Aleksynska et al. (2019), Dunn (2018) Idowu & Elbanna (2020), Jarrahi et al. (2020), Posch et al. (2019) Durward et al. (2020)
	Engaging in learning opportunities	Bellesia et al. (2019), Idowu & Elbanna (2020, 2021), Margaryan (2016, 2019), Gerber (2020a), Jarrahi & Sutherland (2019), Rani & Furrer (2019), Bucher et al. (2021), Gegenhuber et al. (2018), Al-Ani & Stumpp (2016), Anwar & Graham (2020), Sutherland et al. (2020) Soriano & Cabañes (2020), Kinder et al. (2019), Deng & Joshi (2016)