Journal of Workplace Learning

1

The views of employees and staff members on workplace learning affordances and hindrances – a case study from heavy industry

Lauri Lehtonen and Marjaana Veermans
Faculty of Education, University of Turku, Turku, Finland, and

Heta Rintala, Essi Ryymin and Liisa Postareff
HAMK Edu Research Unit, Häme University of Applied Sciences, Hämeenlinna, Finland

Received 28 May 2025
Revised 7 November 2025
Accepted 3 January 2026

Abstract

Purpose – This paper aims to study the views of heavy industry personnel on informal and formal workplace learning, focusing on the affordances, hindrances and views on support and training.

Design/methodology/approach – To gather data for the study, a semi-structured interview was conducted with 14 employees and 7 staff members. The data was analysed thematically using an inductive approach.

Findings – In this study, 13 categories of affordances and 6 categories of hindrances related to workplace learning were found. Interviewees acknowledged training and informal learning such as interaction with co-workers and working with new products and methods, as the most important learning affordances. Lack of time was found to be a major hindrance to workplace learning.

Practical implications – Based on this study, heavy industry companies should expand their support for workplace learning beyond formal training. More emphasis should be placed on supporting informal learning through peer learning models such as working in pairs or small groups.

Originality/value – By studying two different personnel groups in the same company, this study contributes to previous research that shows that opportunities for workplace learning manifested differently at different levels of the workforce.

Keywords Workplace learning, Affordances, Hindrances, Work-based learning, Heavy industry, Tacit knowledge

Paper type Research paper

Introduction

Managing industrial change is one of the great challenges of the 21st century. The current industrial landscape is characterized by varying levels of disruption, which involves fundamentally altering traditional industry or market operations by introducing new methods or technologies (Kilkki *et al.*, 2018). These changes are driven by a multi-faceted interplay of factors including technological advancements, environmental challenges and public health

Journal of Workplace Learning
Vol. 38 No. 9, 2026
pp. 1-17
Emerald Publishing Limited
1366-5626
DOI 10.1108/JWL-05-2025-0158

crises (Arntz *et al.*, 2016; Ghaffar *et al.*, 2022; Rapaccini *et al.*, 2020). The successful management of disruption necessitates a preparedness that addresses both tangible elements such as new technological systems and infrastructures, and intangible elements such as professional practices and skills (Phaal *et al.*, 2011; Amenduni *et al.*, 2022; Adepoju *et al.*, 2022). In a situation of constant change, work-based learning has become a success factor for both employees and organizations. Workers need to be re-skilled and up-skilled as new products, services and business models emerge. (Li, 2022).

According to the OECD report (2020), Finland faces specific challenges in developing the skills of its workforce due to the age structure of its workforce. Poor basic skills are typically concentrated among older age groups, people from low social and economic backgrounds and/or immigrants (OECD, 2012). These workers are typically employed in traditional sectors such as the heavy metal industry. In addition, employees with low basic skills often work in jobs that are expected to disappear with automation. Less educated workers in the operational sectors are also less likely to be enthusiastic about participating in organized training, such as various formal courses (OECD, 2020). Supporting work-based learning in everyday work has therefore been suggested as an effective approach for improving the skills of workers in industrial occupations (Li, 2022).

Many workplaces have systematically developed their employees' opportunities for workplace learning. Typically, employers offer several types of organized training and courses, but they can also allocate study time for their employees to choose for themselves how, and what to study during this allocated time (Fuller and Unwin, 2011). Work-based learning has been acknowledged to be important in the modern world, where new skills, knowledge and abilities to be able to meet the changing demands of work are required (Li, 2022). Under those circumstances especially, it is important to foster employees' will to engage themselves in work-based learning. Willingness to learn and engage in continuous learning are crucial for successful workplace learning (Billett, 2001). Even though employers have carefully designed and launched support for workplace learning, it does not necessarily always meet the needs and wishes of their employees. It is therefore important to discover how industrial workers are engaged in workplace learning, what kind of view they have for support and training.

The purpose of this article is to explore how employees and staff members in a heavy industry company perceive affordances and hindrances related to workplace learning. More specifically, the first aim of the study was to explore what kinds of formal and informal affordances employees and staff members mentioned. The second aim was to explore what possible hindrances employees and staff members mentioned. Finally, a third aim was to explore employees' and staff members' views on support and training.

Theoretical framework

Work-based learning: formal and informal learning

The need for work-based learning in workplaces is considered crucial due to the constant change in working life and the increasing demand for different competencies. The knowledge and skills acquired through formal education or degrees can quickly become outdated in today's fast-paced world. Therefore, work-based learning, which can take various forms, provides a means to update and maintain knowledge and skills. As defined by Evans *et al.* (2013), WBL consists of activities in which humans gain knowledge and skills at work, for work and through work in the context of employment. More narrowly, workplace learning can be addressed from the perspective of work-related learning. Work-related learning is defined as informal and formal learning activities that are linked to one's current or future occupation (Grosemans *et al.*, 2020).

Although formal education and training play a role in workplace learning, research suggests that informal learning comprises most of the learning occurring in the workplace (Decius *et al.*, 2019; Enos *et al.*, 2003; Ellinger, 2004; Manuti *et al.*, 2015; Skule, 2004). Formal learning is typically more structured and often delivered as training by external or internal facilitators (Cerasoli *et al.*, 2018). Training can address more general skills, such as interaction skills, or they can focus on methods tailored to a specific job task. Informal learning is often spontaneous, less structured than formal learning and does not require a high level of awareness of the learning process (Eraut, 2004; Manuti *et al.*, 2015). Informal learning can take place during daily work activities, including problem-solving situations. These situations often generate tacit knowledge about work-related tasks, which can be used to solve similar problems in the future (Slotte and Tynjälä, 2004). Given the nature of informal learning, it has been proposed as a solution to the up- and re-skilling demands of modern work (Gerards *et al.*, 2020; Graßmann and Decius, 2023; Noe *et al.*, 2014).

Even though numerical values and shares have been allocated to different forms of workplace learning (see the 70:20:10 model; Lombardo and Eichinger, 1996). Clardy (2018) found that these rules may not be applicable or valid when describing the importance of informal workplace learning. In addition, it has been suggested that the division between informal and formal workplace learning could be overcome to better design and structure all types of learning experiences (Clardy, 2018; Manuti *et al.*, 2015). Moreover, it is important to note that regardless of the nature or form of learning at work, the quality of learning ultimately depends on an individual's engagement in the learning process and the readiness of the workplace to offer opportunities and support for learning (Billett, 2001).

Workplace learning: affordances and hindrances

Research on assessing the organizational factors that promote or impede learning has been underdeveloped (Skule, 2004). However, as any learning experiences at work are contextually embedded and socially constructed, exploring the contextual factors that may shape employees' learning experiences is critical for understanding how the engagement and learning of individuals can be facilitated and further supported (Billett, 2001; Ellinger, 2004). Moreover, it is important to acknowledge that workplaces are contested environments, where opportunities or affordances for workplace learning may not be equally distributed due to workplace hierarchies, cliques and personal relationships (Billett, 2001, 2004). Therefore, this study aims to describe how learning affordances and hindrances appear for two different personnel groups in a heavy industry company.

From the wider contextual perspective, it is well recognized that a high degree of exposure to changes and demands is associated with high learning opportunities (Skule, 2004). Nevertheless, fast-paced changes and high intensity have also discouraged workplace learning (Thorton Moore, 2004). Moreover, cutbacks, downsizing and rationalization have all been recognized as factors that may challenge the organization of learning in organizations (Svensson and Ellström, 2004; Warhurst, 2013).

From an organizational perspective, learning-committed leadership and management or more generically management support for learning has been recognized as an important factor in creating opportunities for learning (Ellinger, 2005; Ellinger and Cseh, 2007; Skule, 2004; Uhunoma *et al.*, 2021) or ensuring development when facing changes and economic downturns (Warhurst, 2013). In practice, this kind of managerial support has been found to encourage risk-taking and provide feedback and recognition, including rewards (Ashton, 2004; Ellinger, 2005; Skule, 2004). From a wider perspective, this kind of learning-supportive climate promoted by managers has been linked to promoting learning opportunities and resources, appreciation of learning covering both material and non-material rewards and

incentives as well as tolerance of learning-related errors (Nikolova *et al.*, 2014). Seen from the opposite perspective, unsupportive supervisors not focused on serving as coaches, mentors and role models, micromanagement (Ellinger, 2005), as well as lack of meaningful rewards (Lohman, 2005), have been considered hindrances to learning.

Subsequent to management, other relational and social factors among employees such as forming relationships for learning have been found essential in workplace learning (Ellinger, 2005; Fuller and Unwin, 2004). The role of social support has been found particularly important for blue-collar workers who exclusively work in social environments (Decius *et al.*, 2021). Here, extensive professional contacts (Skule, 2004) as well as a wider openness and accessibility of to people have been highlighted (Ellinger, 2005). It has been observed that in a workplace without an open sharing culture, employees may keep their knowledge and skills to themselves, because they may be afraid that other people will take their jobs (Fuller and Unwin, 2004).

Collaborative relationships between older and younger employees have been considered an important facilitator for positive organizational culture, as older employees may comprise an important source of information and knowledge for younger employees (Uhunoma *et al.*, 2021). However, unstable working conditions, temporary contracts, low wages and time constraints create challenges for knowledge transmission, as constant onboarding of new hires is time-consuming and adds to existing workloads (Cloutier *et al.*, 2012). Moreover, knowing how to perform a specific task at the workplace is not the same as transmitting highly detailed information about that task to another person, or even wanting to share it. Effective knowledge transfer requires time allocated for transmitting knowledge, formal mechanisms to capture tacit know-how and organisational recognition of both expertise and the willingness to teach are essential to ensure systematic transfer of knowledge and skills (Ouellet and Vézina, 2008; Conjard and Saint-Genis, 2018). In addition, generational stereotypes or perceptions have been found to act as barriers to communication and interaction whether they are true or false, as older employees are often associated with the role of knowledge senders and younger employees as knowledge receivers (Burmeister *et al.*, 2018). It is good to highlight that knowledge transmission at workplace is a reciprocal process as less experienced employees are also known to help more employees (Fuller and Unwin, 2004). Along with aforementioned issues, the following factors have been found to impede learning: the lack of easy access to colleagues, distance from colleagues physically or related to their areas of work or working in silos (Ellinger, 2005; Lohman, 2005, 2009).

In addition to social factors, there is a need to acknowledge material aspects related to work organization and workplace learning, such as facilities, tools and resources (Ellinger, 2005; Lohman, 2009). In general, a lack of work tools and resources has been found to hinder learning, but the use of tools and resources has also been considered a barrier to learning when causing distractions or decreasing personal interaction (Ellinger, 2005). Considering the aspect of time, lack of time because of heavy workload, job pressures and responsibilities is widely recognized as one of the key barriers to learning (Lohman, 2005).

To summarize, the same contextual factors can act as both affordances and hindrances for learning and have both supportive and inhibiting influences on learning (see also Sambrook and Stewart, 2000). Although identifying these factors may benefit the development of workplace learning, it is also important to acknowledge that the eventual engagement of the employee in workplace learning is also largely based on individual motivation and agency (Billett, 2001).

Method

This article is based on the qualitative data that was collected by interviewing seven staff members and 14 employees from a Finnish heavy industry company. The interviews aimed to gain data concerning commitment to workplace learning. The data was collected during the

spring of 2021. The interviews were part of a larger research project in which the company was participating as a formal partner. This project aimed to gain information about continuous learning at workplaces. The interviewed personnel represented several fields: metal works, engineering, sales and logistics, product development and staff management. In total, there were 20 men and one woman among the interviewees. The interviewees were between 44 and 65 years old. They had 10–46 years of working experience in general and 10–45 years of experience in the specific field they were currently working in. Most of the interviewees had a vocational degree in one of the fields represented in the workplace. Some of the interviewees had bachelor's degrees in one of those fields. Participants were recruited in collaboration with the company's human resources (HR) staff. HR mapped out the participants and scheduled the interviews. Even though the first author conducted the interviews, HR's involvement in the study's recruitment process might have influenced participants' level of critical reflection on current workplace issues. The study's findings were further discussed with two HR specialists from the company to inform practice. Discussions focused on general-level findings, and the content could not be traced back to individual interviewees.

For this study, semi-structured interviews were used to collect data. Background information (i.e. overall work experience and work experience for his/her respected field, education, age and current job assignment) was asked before the recording of the actual interviews. The interview included questions about work and skills, learning, self-development and working community. At the end of the interview, interviewees were also asked to describe a meaningful learning experience related to work. The work and skills theme included questions about tasks and required skills. The learning and self-development part is composed of questions related to continuous learning and motivation. Finally, the working community theme included questions about attitudes, support, feedback, environment, goals and rewards related to workplace learning. The interviews were scheduled to last for a maximum of 45 min; however, some lasted longer, up to 52 min. Nineteen of the interviews were recorded with a handheld recorder, while the remaining two, which were facilitated online, were recorded via MS Teams.

Qualitative content analysis (QCA) was performed for the data since it can be used to find meanings for the data in a data-driven manner (Schreier, 2012). The analysis aimed to describe affordances and hindrances for learning that occur at the studied workplace. Consequently, the inductive approach was selected for the analysis because it aims to form categories from the data itself. Phases of the inductive content analysis used in this study were formerly described by Elo and Kyngäs (2008). The analysis process was conducted by the first and the second authors of this paper.

The analysing process started by transcribing all the interviews *verbatim*. The transcribed interviews were read multiple times by two of the authors to gain a better understanding of the data. After the initial phases, the actual data analysis was conducted manually concerning the aims of this paper.

Pieces of text, such as sentences and words that described learning affordances or hindrances, were used as meaning units of analysis. The interviews were then coded by the first and the second authors. As part of open coding, headings and notes were written in the texts until all aspects of the data were covered. Written headings and notes were then used to form coding sheets and sub-categories. Sub-categories were formed by combining similar concepts that appeared in the interviews. Sub-categories were given names that describe their content accurately. Closely related sub-categories were then grouped and named with higher-order headings, categories and those were then further refined. At this point of the analysis, the authors discussed the concepts and categories to gain a broader view of the data. In the last part of the analysis, abstraction was used to refine the number of categories (Table 1). Final categories were then placed under the main categories derived from the aims of this research:

Table 1. Abstraction process

Quotation	Open code	Sub-category	Category
"…the employer has brought it so that you know what it is like when, for example, chambers of commerce have offered training and through that, when, it is like when they urged you to apply for certain training" (staff member)	Encouragement for training given to staff members	Encouragement and support for training	Training
"Those have been good that has been tailored to our house, those courses that are exactly related to what we do. There are plenty of courses out there, but they are mostly very general, but I feel the best ones are those that are tailored to us, to what we do." (employee)	Task-related training found useful	Tailored training provision	
"In part, yes, sometimes it has felt that they have been a bit too general, that there has been a feeling that there should have been more specific training in our field for what we do, that they have been a bit too general, but certainly not, all of them have been useful" (staff member)	Training is seen as too general, need for specific training	General training	
"When you go to all these like common goods, I don't say that, like some interaction skills, yes you might learn something now and then, but they aren't that interesting" (employee)	General training topics are not interesting		

Source(s): Authors' own work

- formal affordances;
- informal affordances; and
- hindrances.

This process was repeated until the categories formulated a general description of the research topic.

This research followed ethical principles of research with human participants. Ethical evaluation of the research received positive statement by the Research Ethics Committee in Humanities and Social and Behavioural Sciences.

Results

In the following paragraphs, the results are presented according to the three aims of the study. In the following sections, some categories and sub-categories are given only in tabular form, as the participants mentioned them without further elaboration (Table 2).

Formal and informal learning opportunities

In total, from the viewpoint of the staff members and the employees, 13 categories were found which were related to informal and formal workplace affordances:

(1) training;
(2) instructions, working spaces and tools;
(3) development discussions;
(4) master-apprentice model;

Table 2. Mentions of formal and informal affordances across both personnel groups (count)

Type	Employees ($n = 14$)	Staff members ($n = 7$)
Formal	(1) Training (50): • General training (17) • Encouragement and support for training (13) • Tailored training provision (8) • External training (7) • Internal training (5) (2) Instructions, working spaces and tools (15) (3) Development discussions (8) (4) Master-apprentice model (5) (5) Fairs and events (2) *In total: 80*	(1) Training (41): • General training (6) • Encouragement and support for training (13) • Tailored training provision (5) • External training (9) • Internal training (8) (2) Development discussions (5) (3) Transition to a new position (10) (4) Theses (1) (5) Projects (1) *In total: 58*
Informal	(9) New products and work methods (22) (10) Interacting with co-workers (21) (11) More experienced workers (17) (12) Practical work (13) (13) Modelling the work for others (13) *In total: 86*	(9) New products and work methods (20) (10) Interacting with co-workers (18) (12) Practical work (2) *In total: 40*

Source(s): Authors' own work

(5) fairs and events;
(6) transitioning to new position;
(7) theses;
(8) projects;
(9) new products and work methods;
(10) interacting with co-workers;
(11) more experienced workers and tacit knowledge;
(12) practical work; and
(13) modelling the work for others (see Table 2).

From the formal workplace affordances, training was most often mentioned by the employees and the staff members. Mentions in category of training were further categorized into five sub-categories of training: General training, Encouragement and support for training, Tailored training provision and Internal training.

The employees mostly allude to sub-category *General training* in the category of *Training*. The employees and staff members both described that they were offered formal learning opportunities, but quite often the training offered was too general, or otherwise not personally useful:

> Well, it depends on what is the topic, and what is your need, if you need information about hydraulics or electricity, and you will get into one like that, you will feel enthusiastic, but then there are other topics that you don't feel that are so important; those feel rather pointless (Employee, 9).

> In part, yes, sometimes it has felt that they have been a bit too general, that there has been a feeling that there should have been more specific training in our field for what we do, that they have been a bit too general, but certainly not, all of them have been useful (Staff member, 5).

In the sub-category *Encouragement and support for training*, both groups in the study stated that the workplace offers support and organizes training when needed. The employees felt that when a new skill requirement emerges, the workplace offers them specific training when asked. On the other hand, the staff members said that the company gives them information about courses and webinars that take place outside of the workplace. The workplace provides time for the staff members to attend training outside of the workplace:

> […] the employer has brought it so that you know what it is like when, for example, chambers of commerce have offered training and through that, when, it is like when they urged you to apply for certain training (Staff member, 2).

The employees and staff members also stated that the workplace occasionally organizes direct training that is tailored to their needs and working environment. This *Tailored training provision* was especially praised by employees, and they found it more useful than general training. Both groups mentioned that the need for training was usually mapped in development discussions:

> Those have been good that have been tailored to our house, those courses that are exactly related to what we do. There are plenty of courses out there, but they are mostly very general, but I feel the best ones are those that are tailored to us, to what we do (Employee, 6).

In addition to the formal training, work-related *Instructions, spaces and tools* were described as one of the major affordances to workplace learning by several employees. The employees stated that they needed spaces sufficiently large to fit many workers to enhance co-working and sharing of information. They also mentioned that the tools had to be modern and suited for the task at hand:

> What would you compare it to […] yes, of course, yes, of course, if the tools and machines, what is needed, are they up-to-date and, up-to-date and that's all they are, the know-how to use them, yes, I'm sure yes, the tools and the equipment must be in such good condition that (Employee, 9).

One of the major formal affordances according to the staff members was the *Transition to a new position* in the workplace. Many of the interviewed staff members said that they had been working in different positions in the same workplace earlier in their careers. They described that changing to a new position made them learn a great deal and gain a broader view of the company. Staff members also thought that it would be beneficial to add more job rotation to the workplace:

> […] much more, I would like to implement all kinds of work rotations and other things where the team's awareness of all the work tasks in that segment increases, but it doesn't always work out right, it's possible, so it's like that when it's like that that awareness increases and you learn to better understand those other stakeholder groups (Staff member, 2).

New products and work methods was one of the major categories for informal affordances in both groups. Nearly every staff member and employee mentioned that they learned

something from the new products, systems or work methods. Learning about new products, systems and methods was described as an opportunity and a necessity. The employees mentioned that they had to learn new systems and products to keep up with the continuously changing occupational demands. At the same time, new products and systems were seen as motivational and interesting learning opportunities:

> […] new systems always get more complicated and, yes, but that's the way it is, I still like it even though it sometimes gets on my nerves, but it's nice that you must, when you challenge yourself in these kinds of issues, yes, continuous learning is cool (Employee, 10).

> How should I say it, all the time here, of course, our products change, we learn new things, and our knowledge of products increases when new products come out or products are developed, thereby our competence increases, from the product side, I don't know, having been a manager for so long, it becomes a little like from the spine those manager jobs again (Staff member, 6).

Interacting with co-workers was also one of the major informal affordances according to both groups of the study. Employees and staff members described that their workplace culture was open to sharing knowledge and teamwork. Staff members also pointed out that group projects are great learning opportunities when people with different expertise and backgrounds communicate with each other. The staff members described that they had almost daily discussions about learning and self-development. The employees also described that sometimes their co-workers were there giving guidance even without asking:

> […] when learning on the job, if you study, that's your own thing, but there should be as many different people as possible in the same team to solve things, that's where the experience accumulates, and I would see that it's the biggest enriching factor (Staff member, 5).

> Well, you can always learn something from your colleagues, that when you come across new issues, new ones for you, you can get support and advice from your colleagues and, and then also, also then that planning from the design side, yes, you can get support from there too if you just ask (Employee, 9).

In the category *More experienced workers*, the employees mentioned that they had one or perhaps a few designated individuals from whom they could ask for help. Employees said that there's always someone who is an expert in that specific field. However, it is not easy to discover who that person is at the workplace:

> […] if you go to ask the manager, the manager doesn't know, but he may know who to get the information from, but really, but in that situation where you are and without a manager, so when you rely on the designated persons to act, that's the knowhow where you get it, it develops with time (Employee, 7).

The employees described that they learned a considerable amount by just doing their practical work in the categories *Practical work* and *modelling the work for others*. They referred to their practical work situations, in which they need to solve practical problems, and find solutions for those problems. These situations were found to be very positive learning experiences and allowed the employees to engage in their work. It was also explained that their actual work teaches them a great deal:

> There is no shortcut; you can listen even for eight hours to some lecture, but once you go into your vehicle and attach the cable for the diagnostics, that is the moment when you start to understand. And I have realized the same when teaching others that it is only by doing when they understand that you get something out of the four-hour course (Employee, 5).

The employees also often described how learning takes place when a more experienced worker models a phase or process to a less experienced worker. This commits both workers to the learning situation:

> It is so that I learn the best way when someone shows me how it should be done, or shows with a paper so and so, writes, or draws the path clearly how to proceed. That I am not learning it when someone shows it to me with a screen (and slides) that is it so and so (Employee, 3).

Hindrances to learning opportunities

The results related to the second aim of the study showed that there are six factors that the employees and staff members feel limit their possibilities to engage in workplace learning (see Table 3). The most common factor was a lack of time. Over half of the interviewees from both groups described that they could not find enough time for workplace learning. Some of the employees mentioned that work was so hectic that they did not have any time for learning or self-development. Employees also noticed that fast working pace and urgency made it more difficult to learn new things related to work:

> Our work is so hectic that in many cases our product should be already ready when we have not yet even started. So, we don't have much time for studying (Employee, 12).

Lack of information and resources were also limiting factors for workplace learning. Some of the employees described that sometimes they did not have the necessary instructions to learn or proceed in their work. A few of the staff members felt that the workplace turned down some of the requests for training because of the costs. Over half of the staff members also stated that sometimes, it was hard to start learning something just because they had to pause their work or adapt to some kind of new working method:

> Well, I guess the learning away from the old is that you are partly interested in the fact that something can be done in another way, but on the other hand, yes, it has been done this way for years, so it's about giving up your attitude, it must have sometimes been such a limiting factor (Staff member, 7).

The employees highlighted that a shortage of proper tools and an excessive workload impede their learning experiences. Additionally, two respondents expressed difficulty in finding learning support outside the workplace due to the highly specialized nature of their work:

> Lack of instructions in the beginning, and in the phase when the prototype is constructed. That is maybe the biggest issue if you need to name one (Employee, 5).

Table 3. Mentions of hindrances to workplace learning engagement (count)

Employees ($n = 14$)	Staff members ($n = 7$)
• Lack of time (13) • Lack of resources (5) • Lack of information (5) • Professional specialization (3) • Insecurity related to the future (1)	• Lack of time (9) • Lack of resources (3) • Strong routines (4)

Source(s): Authors' own work

The views of employees and staff members on support and training

The third aim of the study was to explore employees' and staff members' views on support and training. The employees mentioned that people at the workplace had different kinds of knowledge related to work that wasn't written in manuals. These types of indications of tacit knowledge appeared in three categories: Interacting with co-workers, Modelling the work for others and Encouragement and support for training. The employees described that some parts of the work had to be done in cooperation with a more experienced worker because some tasks required specific knowledge that was only gained through experience and tradition:

> Well, if there comes a new person to the workplace, he/she needs to be with an older colleague, at least at the beginning. To show how something is done. Some blueprints do not illustrate that a connector needs to have a certain position, otherwise it is not working. People have learned that through trial and error and tell that (the right solution) to the next one, and so on (Employee, 6).

> I had an apprentice last year, and I assembled parts, at least he learned very fast when I showed it. Because nothing was hidden, even the most difficult parts, how to do something. By showing how to do something, you learn (Employee, 7).

One of the employees also mentioned that staffing should focus more on transferring tacit knowledge from employees who are leaving their job to the ones who will take on their responsibilities and assignments. The interview data indicated that currently in the workplace there exist barriers between workers who are leaving his/her job and the rest of the staff:

> When older workers are leaving, some of them are retiring, it is not taken care enough that their know-how would be transferred. And it is not always even about retirement but about someone deciding that this is not my thing, and leaves. Too often comes boundaries between them and others, it is not even asked what he was doing. It would be important, without any doubt, to send someone to learn his duties (before he leaves) (Employee, 11).

This was also acknowledged among the staff members. The staff members mentioned that new employees should be placed to work with the more experienced retiring ones. By doing so, the experienced worker could transfer his/her knowledge that was gained from years of work:

> Well, it would be important when recruiting new people, to do it in time, so that we could transfer the old knowledge, to raise them[…]if it is a one-man's job, we would recruit him a buddy to learn, that he would then be able to continue independently later (Staff member, 4).

According to the employees, peer learning was a significant supporting factor in workplace learning. Most of them mentioned that once they faced difficulties in their work, they went to get help from someone who knew more about the task at hand:

> The fact that you have had damn good colleagues, from whom you have got good advice, and can discuss any issue you cannot solve yourself. You can ask those who know more, so you benefit from it when you ask (someone wiser) immediately when you don't know (Employee, 12).

Some of the staff members also mentioned that peer learning was a way of sharing tacit knowledge in the workplace. They stated that there is considerable amount of expertise scattered among the employees and listening to these employees is a key to self-development:

> […] another issue is maybe that you will listen to those who are working here, there is so much experience here, and so many issues that always someone has surely experience of how you should not do, and you should listen to them (Staff member, 4).

While most of the employees mentioned peers as their source of help, the role of superiors as a means of support was seen as more distant. Some of the employees described that their superiors did not have enough time to help, or they simply directed them to someone who could help. Employees also mentioned that they had a trusted, more experienced worker as a workshop manager whom they could rely on:

> When you go to ask your superior, he or she does not know, but he/she can know whom to ask. But when you are there without superiors, you rely on these trusted workers, workshop managers, you will get that know-how where you get the help. It develops during the time (Employee, 7).

> It is so that the bosses of the factory won't visit much and see what we are doing, and also superiors don't have much time, but there is one staff member who is superb and helps us with many issues. We have meetings with him/her, or have coffee with him/her, during coffee breaks can ask him/her (Employee, 12).

The staff members also described that sometimes they did not have enough time to manage the issues that took place in the workshop. That is why they used trusted workers and workshop managers to provide the needed support for the employees:

> I thought that since they are assigned there, so you need to use them also; from that point I have started to develop this system since I don't have time to go there, so these trusted workers (workshop managers) can do some of my duties related to the supervision of work (Staff member, 5).

Even though the staff members were not aware of what was happening at the workshop daily, they mentioned that they made sure that employees had the necessary skills to do their jobs. The staff members said that the employees are trained when new systems, tools or work methods are introduced. Training was also provided when internal changes took place at the workplace:

> If there comes a new tool, or software or something, so we try to get as quickly as possible and for many, and many times trainings, but of course, it affects on those workloads who give the training, however, positively (Staff member, 3).

The internal training was primarily seen as need-based, but both the employees and staff members felt that the workplace provided support for external training. They mentioned that the workplace gave support when individuals raised their desire and motivation for professional development:

> Well, if you would see some training that you would like to go, you could, there is positive attitude towards that. And some employees have been sent on different types of courses to train themselves further. If you just have the motivation for it, surely you can go (Staff member, 6).

Discussion of the findings and conclusions

The article introduces informal and formal workplace affordances that facilitate workplace learning from the perspectives of staff members and employees in a heavy industry company. Thirteen categories of affordances were identified, including training, instructions, workspaces and development discussions. General training and general encouragement and support for training, were found to be the most important formal training sub-categories for employees, although they often found the training offered to be too general. Encouragement

and support for training, direct training tailored to their needs and mapping of training needs in development discussions were also mentioned.

Informal learning opportunities were seen as very important for learning at work. Interaction with colleagues was another important informal affordance, with both groups emphasising the importance of a workplace culture that encourages knowledge sharing and teamwork (Svensson and Ellström, 2004). The study also identified new products and ways of working as an important category of informal affordances, with both staff members and employees seeing these as both an opportunity and a necessity when to keeping up with demands of the changes in their job. This kind of exposure to changes in the workplace has been associated with high-level learning opportunities (Skule, 2004). More experienced workers were seen as valuable resources for learning, although finding the right person can be a challenge. Practical work and modelling work for others were also identified as categories of informal affordances, with employees describing how they learned from their work and from more experienced colleagues who modelled processes and stages.

Employees and staff members recognised the importance of tacit knowledge, which is acquired through experience and tradition, though they noted barriers to transferring this knowledge among employees. Peer learning was seen as a critical support for workplace learning, with most employees seeking help from more knowledgeable colleagues (Decius *et al.*, 2021). Staff members mentioned that new workers should be paired with more experienced, retiring workers to facilitate the transfer of accumulated tacit knowledge (Uhunoma *et al.*, 2021). This can be considered a starting point for knowledge transmission, but to successfully externalize the expertise and experience accumulated over years of work, older employees need holistic support. As noted in earlier research, experienced workers might not know how to explain highly contextual and detailed procedures, even though they have mastered them themselves (Ouellet and Vézina, 2008), and in some cases, they might not even realise all the details because of the highly automatized performance developed through years of repetition (Conjard and Saint-Genis, 2018). Employees also stated that working spaces should support discussion and collaboration (Ellinger, 2005; Lohman, 2005, 2009). Both employees and staff members identified lack of time as the greatest challenge to continuous learning at work (Lohman, 2005). In addition, based on the interviews, modelling one's own work, explaining complex tasks, or answering a colleague's question are important ways of informal learning. Earlier research has shown that these activities are often added on top off other daily job tasks (Cloutier *et al.*, 2012; Santos *et al.*, 2019). Participants' concerns about the lack of time and the added load of knowledge transmission are addressed in the literature (Cloutier *et al.*, 2012; Santos *et al.*, 2019) which can spiral into events that decrease overall well-being and motivation to transmit knowledge daily.

The results of this study reveal that there are many opportunities for informal learning in normal day-to-day work, of which both employees and staff members are partly aware, but which have not been systematically and purposefully introduced as a means of continuous workplace learning. For example, a peer learning model could be organized in which employees work in pairs or small groups. In these circumstances, low-skilled workers in particular, who are less likely to seek formal training (see e.g. in OECD, 2020) could effectively learn new skills by working on the job with a more experienced and knowledgeable master. In line with the staff members' idea, new employees could work with an experienced employee who is about to retire. In this way, the skills and tacit knowledge of particularly competent individuals would be retained by the company even when the person retires. To effectively implement peer learning or mentoring models, highly skilled employees should be involved in training related to knowledge transfer and mentoring

planning processes to externalise the critical tacit knowledge associated with job tasks. They should also receive training on how to communicate experiential expertise to less experienced colleagues (Santos *et al.*, 2019). Both groups of personnel highlighted that knowledge is dispersed among a wide range of individuals in the workplace, and that it is important to know whom to approach for guidance and assistance. The company could tackle this issue by establishing mentor networks to support less experienced employees. Although this requires organisational resources, it could save time daily in finding the necessary information to perform roles effectively.

In fast-changing and disruptive industrial sectors, traditional and formal training pathways may be too slow to update workers' skills. For this reason, the everyday working environment should also be seen as a versatile learning environment, which should make more targeted and effective use of the opportunities for continuous workplace learning. Based on the findings, the study suggests that continuous workplace learning should be part of a company's strategic objectives and design process of working spaces. In line with the suggestions of Li (2022), both staff members and employees need to be committed to continuous learning, reskilling, upskilling and making skills development an essential phase of the future workforce. Great efforts should be made to make workplace learning opportunities known, accessible and available to the workforce in the transforming heavy industry sector.

Companies could develop innovative and systemic learning programs to support continuous workplace learning, encompassing both formal and informal learning affordances. The transformative drivers in heavy industry, such as digitalization, globalization and artificial intelligence, introduce numerous novel approaches to organizing learning at workplaces. For instance, digitalization may enable the use of e-learning platforms and virtual reality simulations for training on machinery and safety procedures. Globalization can foster cross-border knowledge sharing through virtual collaboration networks and international exchange programs, enriching employees with diverse perspectives and skills. Artificial intelligence powers personalised learning paths via AI-driven LMSs (Learning Management Systems) and predictive analytics, ensuring employees stay ahead of the latest industry developments. These advancements may have the potential to create a dynamic and effective learning environment that adapts to the evolving needs of the transforming industry and workforce.

Funding

This work was funded by The Finnish Work Environment Fund.

References

Adepoju, O., Aigbavboa, C., Nwulu, N. and Onyia, M. (2022), "Building information modelling", *Re-Skilling Human Resources for Construction 4.0: Implications for Industry, Academia and Government*, Springer International Publishing, pp. 43-64, doi: 10.1007/978-3-030-85973-2_3.

Amenduni, F., Ryymin, E., Maetoloa, K. and Cattaneo, A. (2022), "Facing disruptive changes with informal workplace learning strategies: the experience of European companies", *Frontiers in Psychology*, Vol. 13, p. 889850, doi: 10.3389/fpsyg.2022.889850.

Arntz, M., Gregory, T. and Zierahn, U. (2016), "The risk of automation for jobs in OECD countries: a comparative analysis", *OECD Social, Employment and Migration Working Papers*, *189* OECD, Paris, p. 14, doi: 10.1787/5jlz9h56dvq7-en.

Ashton, D.N. (2004), "The impact of organisational structure and practices on learning in the workplace", *International Journal of Training and Development*, Vol. 8 No. 1, pp. 43-53.

Billett, S. (2001), "Learning through work: workplace affordances and individual engagement", *Journal of Workplace Learning*, Vol. 13 No. 5, pp. 209-214.

Billett, S. (2004), "Workplace participatory practices: Conceptualising workplaces as learning environments", *Journal of Workplace Learning*, Vol. 16 No. 6, pp. 312-324.

Burmeister, A., Fasbender, U. and Deller, J. (2018), "Being perceived as a knowledge sender or knowledge receiver: a multistudy investigation of the effect of age on knowledge transfer", *Journal of Occupational and Organizational Psychology*, Vol. 91 No. 3, pp. 518-545.

Cerasoli, C.P., Alliger, G.M., Donsbach, J.S., Mathieu, J.E., Tannenbaum, S.I. and Orvis, K.A. (2018), "Antecedents and outcomes of informal learning behaviors: a meta-analysis", *Journal of Business and Psychology*, Vol. 33 No. 2, pp. 203-230, doi: 10.1007/s10869-017-9492-y.

Clardy, A. (2018), "70-20-10 And dominance of informal learning: a fact in search of evidence", *Human Resource Development Review*, Vol. 17 No. 2, pp. 153-178.

Cloutier, E., Ledoux, É. and Fournier, P.-S. (2012), "Knowledge transmission in light of recent transformations in the workplace", *Relations Industrielles*, Vol. 67 No. 2, pp. 304-324.

Conjard, P. and Saint-Genis, E. (2018), "Experiential knowledge transmission", *Arbetsmarknad and Arbetsliv*, Vol. 16 No. 2, pp. 37-50.

Decius, J., Schaper, N. and Seifert, A. (2019), "Informal workplace learning: development and validation of a measure", *Human Resource Development Quarterly*, Vol. 30 No. 4, pp. 495-535.

Decius, J., Schaper, N. and Seifert, A. (2021), "Work characteristics or workers' characteristics? An input-process-output perspective on informal workplace learning of blue-collar workers", *Vocations and Learning*, Vol. 14 No. 2, pp. 285-326, doi: 10.1007/s12186-021-09265-5.

Ellinger, A.D. and Cseh, M. (2007), "Contextual factors influencing the facilitation of others' learning through everyday work experiences", *Journal of Workplace Learning*, Vol. 19 No. 7, pp. 435-452.

Ellinger, A.D. (2004), "The concept of self-directed learning and its implications for human resource development", *Advances in Developing Human Resources*, Vol. 6 No. 2, pp. 158-177.

Ellinger, A.D. (2005), "Contextual factors influencing informal learning in a workplace setting: the case of 'reinventing itself company', *Human Resource Development Quarterly*, Vol. 16 No. 3, pp. 389-415.

Elo, S. and Kyngäs, H. (2008), "The qualitative content analysis process", *Journal of Advanced Nursing*, Vol. 62 No. 1, pp. 107-115.

Enos, M.D., Kehrhahn, M.T. and Bell, A. (2003), "Informal learning and the transfer of learning: How managers develop proficiency", *Human Resource Development Quarterly*, Vol. 14 No. 4, pp. 369-387.

Eraut, M. (2004), "Informal learning in the workplace", *Studies in Continuing Education*, Vol. 26 No. 2, pp. 173-247.

Evans, K., Guile, D. and Harris, J. (2013), "Rethinking work-based learning: for education professionals and professionals who educate", *The SAGE Handbook of Workplace Learning*, Sage, Los Angeles, CA, pp. 149-161.

Fuller, A. and Unwin, L. (2004), "Young people as teachers and learners in the workplace: challenging the novice-expert dichotomy", *International Journal of Training and Development*, Vol. 8 No. 1, pp. 32-43.

Fuller, A. and Unwin, L. (2011), "Workplace learning and the organization", in Malloch, M., Cairns, L., Evans, K. and O'Connor, B. (Eds.), *The SAGE Handbook of Workplace Learning*, Sage, Los Angeles, CA, pp. 46-59.

Gerards, R., de Grip, A. and Weustink, A. (2020), "Do new ways of working increase informal learning at work?", *Personnel Review*, Vol. 50 No. 4, pp. 1200-1215, doi: 10.1108/PR-10-2019-0549.

Ghaffar, S.H., Mullett, P., Pei, E. and Roberts, J. (2022), *Innovation in Construction: A Practical Guide to Transforming the Construction Industry*, Springer.

Graßmann, C. and Decius, J. (2023), "Self-development in the twenty-first century: an exploratory analysis of the relationship between new work characteristics and informal workplace learning",

Gruppe. Interaktion. Organisation. Zeitschrift Für Angewandte Organisationspsychologie (GIO), Vol. 54 No. 3, pp. 289-299, doi: 10.1007/s11612-023-00702-8.

Grosemans, I., Smet, K., Houben, E., Cuyper, N.D. and Kyndt, E. (2020), "Development and validation of an instrument to measure work-related learning", *Scandinavian Journal of Work and Organizational Psychology*, Vol. 5 No. 1, pp. 1-16.

Kilkki, K., Mäntylä, M., Karhu, K., Hämmäinen, H. and Ailisto, H. (2018), "A disruption framework", *Technological Forecasting and Social Change*, Vol. 129, pp. 275-284, doi: 10.1016/j.techfore.2017.09.034.

Li, L. (2022), "Reskilling and upskilling the future-ready workforce for industry 4.0 and beyond", *Information Systems Frontiers*, Vol. 26 No. 5, doi: 10.1007/s10796-022-10308-y.

Lohman, M.C. (2009), "A survey of factors influencing the engagement of information technology professionals in informal workplace learning activities", information technology", *Learning and Performance Journal*, Vol. 25 No. 1, pp. 43-52.

Lohman, M.C. (2005), "A survey of factors influencing the engagement of two professional groups in informal workplace activities", *Human Resource Development Quarterly*, Vol. 16 No. 4, pp. 501-527.

Lombardo, M.M. and Eichinger, R.W. (1996), "*The Career Architect Development Planner*, 1st ed. Lominger, Minneapolis, MN.

Manuti, A., Pastore, S., Scardigno, A.F., Giancaspro, M.L. and Morciano, D. (2015), "Formal and informal learning in the workplace: a research review", *International Journal of Training and Development*, Vol. 19 No. 1, pp. 1-17.

Nikolova, I., Van Ruysseveldt, J., De Witte, H. and Van Dam, K. (2014), "Learning climate scale: Construction, reliability and initial validity evidence", *Journal of Vocational Behavior*, Vol. 85 No. 3, pp. 258-265.

Noe, R.A., Clarke, A.D. and Klein, H.J. (2014), "Learning in the twenty-first-century workplace", *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 1 No. 1, pp. 245-275, doi: 10.1146/annurev-orgpsych-031413-091321.

OECD (2012), "Education GPS. Finland survey of adult skills PIAAC 2012", available at: https://gpseducation.oecd.org/CountryProfile?primaryCountry=FIN&treshold=10&topic=AS (accessed 26 April 2023).

OECD (2020), *Continuous Learning in Working Life in Finland, Getting Skills Right*, OECD Publishing, Paris, doi: 10.1787/2ffcffe6-en.

Ouellet, S. and Vézina, N. (2008), "Professional know-how and MSD prevention: conceptual and methodological reflection leading to their identification and the start of their construction", *Perspectives Interdisciplinaires Sur Le Travail Et la Santé*, Vol. 10 Nos 10-12, pp. 1-15.

Phaal, R., O'Sullivan, E., Routley, M., Ford, S. and Probert, D. (2011), "A framework for mapping industrial emergence", *Technological Forecasting and Social Change*, Vol. 78 No. 2, pp. 217-230, doi: 10.1016/j.techfore.2010.06.018.

Rapaccini, M., Saccani, N., Kowalkowski, C., Paiola, M. and Adrodegari, F. (2020), "Navigating disruptive crises through service-led growth: the impact of COVID-19 on Italian manufacturing firms", *Industrial Marketing Management*, Vol. 88, pp. 225-237, doi: 10.1016/j.indmarman.2020.05.017.

Sambrook, S. and Stewart, J. (2000), "Factors influencing learning in European learning-oriented organisations: issues for management", *Journal of European Industrial Training*, Vol. 24 No. 2-4, pp. 209-219.

Santos, M., Pereira, C., Silva, D., Cadilhe, M.A. and Cunha, L. (2019), "Developing a mentoring programme in the chemical industry: from conceptual development to implementation follow-up", *Journal of Workplace Learning*, Vol. 31 No. 1, pp. 42-58.

Schreier, M. (2012), *Qualitative Content Analysis in Practice*, Sage, London.

Skule, S. (2004), "Learning conditions at work: a framework to understand and access informal learning in the workplace", *International Journal of Training and Development*, Vol. 8 No. 1, pp. 8-20.

Slotte, V. and Tynjälä, P. (2004), "How do HRD practitioners describe learning at work?", *Human Resource Development International*, Vol. 7 No. 4, pp. 481-499.

Svensson, L. and Ellström, P.-E. (2004), "Integrating formal and informal learning at work", *Journal of Workplace Learning*, Vol. 16 No. 8, pp. 479-491.

Thorton Moore, D. (2004), "Curriculum at work: and educational perspective on the workplace as a learning environment", *Journal of Workplace Learning*, Vol. 16 No. 6, pp. 325-340.

Uhunoma, O., Lim, D.H. and Kim, W. (2021), "The mediating role of informal learning on work engagement: older workers in the US public sector", *European Journal of Training and Development*, Vol. 45 Nos 2-3, pp. 200-217.

Warhurst, R.P. (2013), "Learner in age of cuts: managers as enablers of workplace learning", *Journal of Workplace Learning*, Vol. 25 No. 1, pp. 35-56.

Corresponding author
Lauri Lehtonen can be contacted at: laalleh@utu.fi