Facilitators and Barriers to Workplace Learning Among Blue-Collar Workers: A Systematic Literature Review

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Abstract

This literature review identifies the facilitators and barriers to workplace learning among blue-collar workers by synthesizing findings from 56 empirical studies. A total of 348 antecedents were identified and classified into three levels: micro (N=193), meso (N=27), and macro (N=128). The findings reveal that the most frequently examined antecedents in the literature pertain to workplace climate (N=111), individual attributes (N=87), and job characteristics (N=63). The analysis highlights that learning in the workplace is shaped by a complex interplay of individual, job-related, and organizational factors. Accordingly, organizations seeking to enhance learning outcomes should adopt a comprehensive approach that considers influences at multiple levels, including individual characteristics, job design, and workplace structures. Despite the breadth of existing research, a notable gap remains: the absence of a theoretical model that explains workplace learning among blue-collar workers through causal relationships rather than mere correlations. Future research should focus on developing and validating such frameworks to provide deeper insights into the processes that foster or hinder workplace learning in this sector.

1. Introduction

1.1 Problem Statement

The manufacturing sector is undergoing rapid transformation due to the advent of sophisticated technologies that streamline production, introduce innovative features, and reduce operational costs. This rapid technological progression compels workers to continually update their skills, underlining the importance of ongoing learning and upskilling (Shahlaei & Lundh Snis, 2023). Global trends, including heightened workforce mobility, increased diversity, and evolving geopolitical and economic factors, further highlight the demand for adaptive and flexible workers capable of handling complex, data-driven production systems (Billett, 2024).

While production employees, commonly referred to as blue-collar workers, play a pivotal role in manufacturing, their specific learning needs are often overlooked (Decius et al., 2021). Blue-collar workers, typically engaged in physical tasks on factory floors or construction sites, require specialized training to perform their duties efficiently, safely, and in compliance with evolving industry standards (Bashir, 2013; Mittal et al., 2019; Snell & Gekara, 2022). Ensuring their motivation for doing their job effectively and efficiently, and keeping them updated are essential for maintaining a competitive workforce.

However, there exist noteworthy barriers to the learning process for blue-collar workers, stemming from the nature of their job and their personal factors. For instance, job-related barriers are, time constraints and the substantial need for experiential knowledge for effective and efficient performance (Hirsch-Kreinsen & Ten Hompel, 2017, as cited in Decius et al., 2021). Additionally, companies may struggle to allocate sufficient learning time for the blue-collar worker. Personal factors encompass issues such as low qualifications and language proficiency (Decius et al., 2021). To address these unique barriers, production-related workplace learning approaches need innovative methods to empower employees for independently tackling workplace challenges (Cachay et al., 2012).

Due to the practical and hands-on nature of blue-collar work, formal learning programs often fail to align with actual workplace demands. Instead, informal workplace learning (IWL), driven by personal interest and integrated into daily tasks, serves as a more effective alternative (Cerasoli et al., 2018). This approach allows workers to acquire new knowledge and

skills more efficiently, as it is directly relevant to their job responsibilities and workplace environment.

Although scholarly attention to workplace learning has grown in recent years, a gap remains in understanding how these learning processes manifest among production workers (Decius et al., 2019). Specifically, research focusing on the antecedents of informal workplace learning in blue-collar settings is sparse. The few existing studies yield inconsistent findings, suggesting that workplace learning processes in industrial contexts are both complex and contingent on various organizational and individual factors (Decius et al., 2024). This inconsistency underscores the necessity for a comprehensive literature review that probes deeper into how blue-collar workers learn at work, the organizational conditions that facilitate or impede their learning, and the specific contextual factors that differentiate them from other segments of the workforce. Such an in-depth exploration would illuminate the unique requirements of blue-collar roles, offering insights that inform the development of tailored learning opportunities aligned with the physical, technical, and experiential components of these jobs. By identifying factors that either facilitate or hinder workplace learning, managers and HR professionals can devise more effective strategies to promote a learning culture, encourage knowledge sharing, and bolster overall operational efficiency.

Hence, the main purpose of this study is to synthesize existing research on workplace learning—particularly IWL— among blue-collar workers to identify both facilitators and barriers highlighted in the literature, that shape their workplace learning experiences and outcomes.

2. Theoretical Framework

2.1 Blue-collar Workers

Blue-collar jobs, often characterized by manual labour, encompass a wide range of roles including construction, manufacturing, maintenance, repair, and proficiency in handling machines and equipment (Snell & Gekara, 2022). These positions typically involve hands-on tasks that require physical effort and practical skills. Blue-collar work is often associated with repetitive tasks, rigid procedures, and sometimes limited opportunities for communication

within the workplace (Molino et al., 2020). The nature of these jobs demands consistency and adherence to established processes to ensure efficiency and safety.

For the majority of blue-collar roles, formal education is not typically necessary, because these employees frequently gain their knowledge and skills through practical, hands-on experience (Mittal et al., 2019). This on-the-job learning allows workers to develop the competencies needed to perform their tasks effectively. Furthermore, companies may be unable to allocate sufficient time for employees to engage in additional learning activities, focusing instead on immediate productivity demands (Cerasoli et al., 2018; Decius et al., 2019).

However, certain characteristics and backgrounds of these employees can hinder their learning and development processes. For instance, they might have lower vocational qualifications and hold unfavourable views about formal training due to past educational experiences. Additionally, language barriers may arise, especially in industries with high rates of migrant workers (Decius et al., 2021).

Despite these challenges, blue-collar workers who acquire additional knowledge and expertise can significantly enhance team productivity and are able to undertake more complex tasks compared to their less-skilled peers (Cinar, 2023). This indicates that learning and skill development are vital for blue-collar employees to improve their abilities, contribute more effectively to their teams, and advance in their careers. Moreover, blue-collar workers may find learning valuable because acquiring new skills can boost their position and reputation among peers, providing personal and professional benefits (Cinar, 2023).

Contrary to widespread negative perceptions about blue-collar workers' attitudes toward learning, Koekemoer et al. (2019) found through interviews that demonstrating a quick learning ability and consistently expanding personal knowledge and skills are considered indicators of career success among this group. This suggests that blue-collar workers do value learning and can be motivated to develop their competencies. Therefore, research into the facilitators and barriers of workplace learning among blue-collar workers can provide valuable insights into how to foster a learning culture within these environments.

2.2 Workplace Learning

Research on the workplace has yielded a rich collection of insights about learning within, through, and at the workplace (Brandi & Iannone, 2016). Kyndt et al. (2023) explains that workplace learning entails the integration of learning and work processes, with the goal of transferring knowledge, skills, and attitudes to improve work outcomes. Workplace learning can help employees obtain and keep their jobs, accomplish their career objectives, and support the ongoing stability of their workplaces (Billett, 2024).

Workplace learning includes both formal and informal activities, varying in awareness, intention, autonomy, and structured organizational support (Kyndt et al., 2023). While it has traditionally cantered on formal education and training, informal methods—such as mentorship, on-the-job training, and online knowledge sharing—are now widely recognized for their effectiveness (Brandi & Iannone, 2017). When factors like budget constraints or logistical challenges hinder formal instruction, IWL offers a cost-effective path for skill development and can complement existing staff development strategies (Cerasoli et al., 2018).

Most workplace learning occurs informally through feedback, peer interactions, reflection, observation, and learning by doing during employees' regular tasks or projects (Decius et al., 2019; Tannenbaum & Wolfson, 2022). Informal workplace learning (IWL), is unplanned and spontaneous, enabling individuals to acquire new knowledge, skills, or attitudes naturally and often without deliberate intent (Kyndt et al., 2018). IWL is seamlessly woven into everyday job tasks, and it fosters enduring performance improvements and professional growth (Kyndt et al., 2018). However, engagement in workplace learning varies across sectors and professions (Decius et al., 2019). For example, blue-collar workers often rely on on-the-job, trial-and-error learning rather than formal training programs, partly due to negative associations with formal instruction stemming from unfavourable past educational experiences (Decius et al., 2019).

When implemented effectively, IWL enhances organizational competitiveness and supports employee development. Recognizing the specific contexts and job characteristics in which IWL takes place is essential for its success, as learning needs and practices differ across industries and roles. Blue-collar workers, in particular, benefit from IWL's immediate

applicability: encountering and resolving workplace problems fosters skill acquisition that can be applied directly to their tasks, generating tangible, immediate advantages (Decius et al., 2019).

2.3 Antecedents of Workplace Learning

Kyndt and Baert (2013) conducted an extensive literature review, providing a nuanced framework for conceptualizing work-related learning by categorizing its antecedents into three distinct levels. At the micro-level, they argue that factors such as sociodemographic background, personal characteristics, and specific job attributes significantly influence work-related learning activities. This perspective emphasizes that a person's unique profile is a critical determinant of their learning behaviour (Kyndt & Baert, 2013). Furthermore, the study's outcomes indicate a favourable correlation between an individual's intention to learn and their actual involvement in learning activities. An employee's desire to engage in learning is closely related to their personal attitude, perceived social expectations, confidence in their abilities, and job-related factors.

Moving beyond the micro level, Kyndt and Baert (2013) highlight the importance of the learning activity itself as a key factor (meso level). The way in which these activities are structured and delivered can greatly impact participation. Additionally, they contend that the broader organizational environment and social context—comprising elements like company policies, cultural norms, and external influences—play an essential role in shaping learning opportunities (macro level).

2.4 Research Question

What are the antecedents (facilitators and barriers) of workplace learning in the literature on blue-collar workers?

3. Method

This section summarizes the systematic approach used to address the research question and justifies the decisions made throughout the review. Following Petticrew and Roberts (2008) the process involved defining the research question, selecting search terms, identifying suitable

databases, conducting the search, applying inclusion and exclusion criteria, and extracting data. To report on the findings effectively, a reproducible method was used throughout the process.

3.1 Literature Search Strategy

In the initial phase, searches were conducted using online databases and search engines to locate relevant articles. The electronic databases that were included are: Education Resources Information Center (ERIC), APA PsycInfo, Business Source Premier, and Social Science Citation Index. The search covers the period from 2012 through 2024. The starting date of 2012 was chosen to build on the foundational work of Kyndt and Baert (2013).

A targeted search was designed to capture workplace learning antecedents specific to blue-collar workers. These terms were selected to capture the various workplace learning processes, incorporating terms related to these occupations. The key search words are as follows:

1. Learning
2. Informal Learning activities
3. Work-related learning
4. Workplace learning
5. Informal learning
6. Learning triggers
7. Learning blockers
8. Learning barriers

AND

- Blue-collar workers
- Production workers
- Frontline workers
- Low qualified employees
- Low skilled jobs

The following search string was applied to the databases for the period from January 2012 to December 2024, yielding 155 relevant articles:

AB=((“Informal Learning activities” OR “Work-related learning” OR “Workplace learning” OR “informal learning” OR “Learning triggers” OR “Learning blockers” OR “Learning barriers”) AND (“Blue-collar workers” OR “production workers” OR “frontline workers” OR “Low qualified employees” OR “Low skilled jobs”))

After conducting the blue-collar–focused search, the review expanded in collaboration with a research team at Maastricht University. This team had previously employed the same databases and the following search terms from January 2012 to September 2022, identifying 114 articles on (1) individual and structural factors influencing engagement in work-related learning, and (2) antecedents of workplace learning. Building on their efforts, the search was extended to December 2024, resulting in an additional 551 articles. The key search words are as follows:

1. Work-related learning 2. Workplace learning 3. Lifelong learning 4. Informal learning 5. Development activities 6. Learning and development	AND	- Employees - Workers - Job seekers - Unemployed - Graduates

These broader terms were intended to capture various contexts of workplace and work-related learning. For this series, the following search string was developed:

AB=((“Work-related learning” OR “Workplace learning” OR “Lifelong learning” OR “Informal learning” OR “Development activities” OR “Learning and development”) AND (Employees OR Workers OR “Job seekers” OR Unemployed OR Graduates))

Both search strategies were employed to ensure comprehensive coverage: initially focusing on blue-collar workers and subsequently incorporating a broader search, thereby capturing extensive empirical evidence on the facilitators and barriers to workplace learning.

3.2 Selection Process and Quality Appraisal

The articles were initially selected by the author of this thesis and subsequently reviewed by a second researcher. Any specific uncertainties were collaboratively discussed to reach a consensus. Each chosen study then underwent a critical appraisal process. This

appraisal was conducted by the author, with any questions or doubts addressed through discussions with the second researcher. The main criteria for quality assessment included: (1) a well-defined research question, (2) an appropriate research design, (3) suitable methods for data collection and analysis, and (4) a clear and comprehensive presentation of the research findings (Aveyard, 2010 as cited in Kyndt et al., 2018).

3.3 Inclusion Criteria

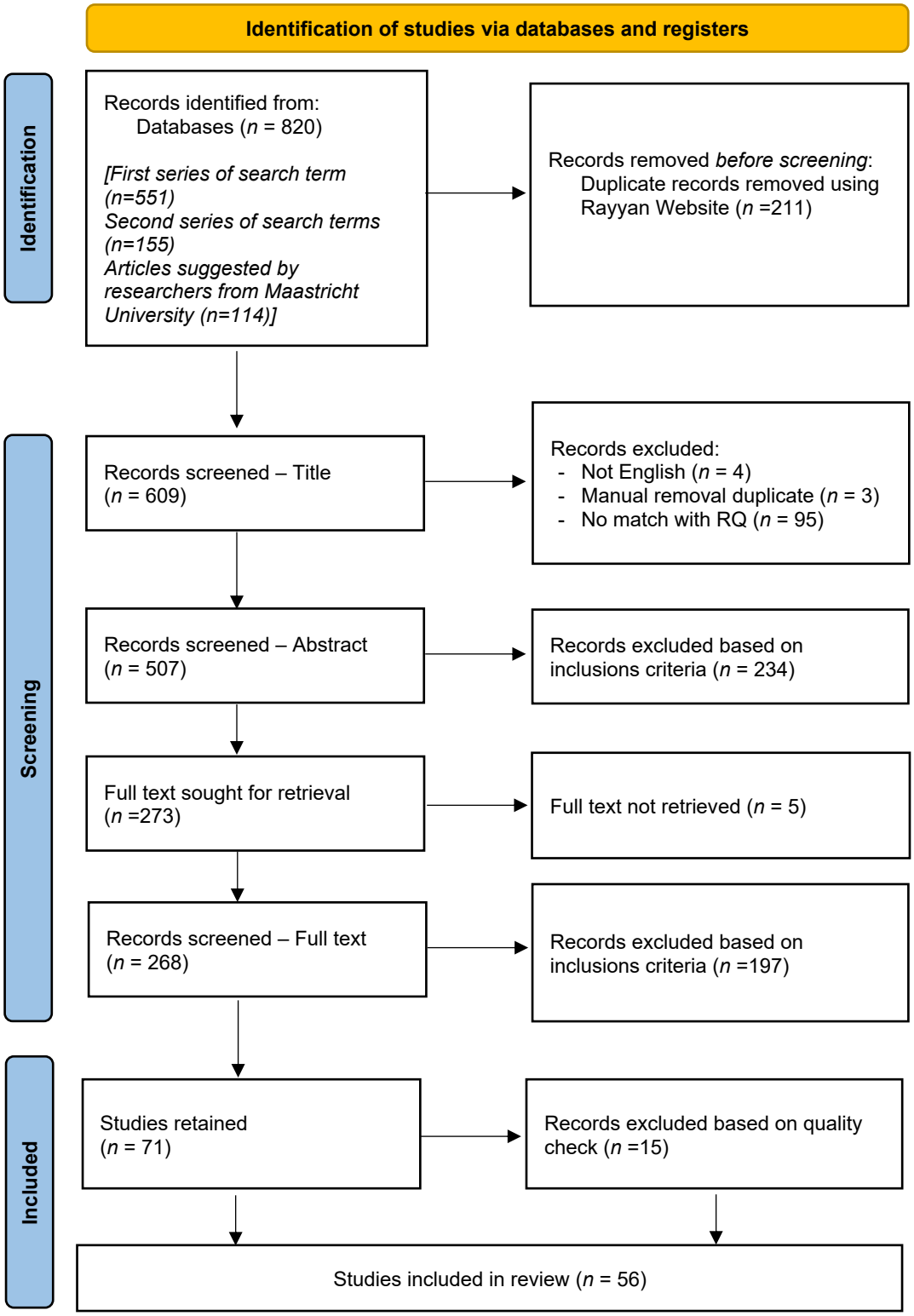
In this review, we included studies that examine actual engagement in non-formal and informal workplace learning at the individual level, in the context of production workers, industries and low qualified employees. Articles that exclusively examined formal work-related learning were excluded from the analysis. However, studies that investigated both formal and informal workplace learning were included, as they aligned with the inclusion criteria by addressing the informal aspect of learning within workplace contexts.

Research situated in vocational schools was included, given its alignment with practical, blue-collar contexts. While our primary focus was on low-qualified employees and blue-collar workers, we extended the scope to studies with diverse employee populations to enhance generalizability. However, studies focusing solely on highly skilled or highly educated groups (e.g., university professors or nurses) were excluded. Furthermore, research that examined the role of management and supervisors, as well as studies in manufacturing settings, was included. Even when these studies involved supervisors or managers, they were retained if they provided insight into the workplace environments of blue-collar workers. This approach enhances our dataset by offering a comprehensive understanding of how informal learning processes function across different organizational levels and work environments, thereby enriching our analysis of workplace learning dynamics.

Ultimately, 56 studies were included for the final evaluation as a result of the selection procedure, which is shown in the PRISMA flow diagram (Figure 1). These chosen studies were carefully reviewed and subjected to in-depth analysis.

Figure 1

PRISMA 2020 Flow Diagram Adapted from Page et al. (2021)



3.4 Analysis

The selected articles were systematically analysed to extract key study details—such as the country, participant demographics, job characteristics, organization size, and identified antecedents—which were then recorded in an Excel spreadsheet to create a coding framework. The primary goal was to determine the types of workplace learning and to identify constructs acting as facilitators or barriers, including how these constructs were operationalized and measured.

In analysing the collected studies, it became apparent that the factors influencing workplace learning among blue-collar workers are both diverse and multifaceted. To effectively capture and present these complexities, the identified antecedents were categorized according to Kyndt and Baert (2013) into three levels—micro, meso, and macro. Micro-level antecedents encompass individual attributes, personal characteristics, and job characteristics. Meso-level antecedents focus on factors associated with the learning activity or tools themselves, while macro-level antecedents include organizational and contextual elements, such as workplace climate, organizational characteristics, and the broader context. Both workplace learning facilitators and barriers extracted from the articles were then coded based on these levels, allowing for a systematic synthesis of the findings.

Additionally, the outcome variables varied across the reviewed articles, with some studies using different terminology to describe similar constructs. During the initial round of the literature review, the dependent variables were recorded exactly as they appeared in the respective articles to maintain accuracy and consistency. However, to facilitate analysis and synthesis, these variables were subsequently grouped into broader categories based on their underlying similarities. This process resulted in the emergence of four distinct categories: *formal workplace learning*, *informal workplace learning*, *work-related learning*, and *workplace learning*. In general, the categorization of the antecedents and outcome variables provided a comprehensive overview of the various factors influencing workplace learning, highlighted research gaps, and presented the data in a clear, structured manner.

4. Results

The following section presents the results of the literature review, focusing on the diverse antecedents that influence workplace learning. These antecedents are organized into three levels (micro, meso, and macro) to reflect the multifaceted nature of learning contexts. A total of 348 antecedents (facilitators and barriers) were identified across the 56 reviewed articles, categorized into three levels: 193 at the micro level, 27 at the meso level, and 128 at the macro level. The distribution of antecedents among the categories and their definitions are shown in Table 1.

Table 1

Distribution of Antecedents in Different Levels and Categories

Level	Subcategories	Definition	Number	Total
Micro				193
	Sociodemographic Characteristic	Factors related to demographics, personal circumstances, job details affecting workplace learning	38	
	Individual Attributes	Attributes that are related to an individual's personal traits and have an impact on workplace learning.	87	
	Job Characteristics - Allocation of work	Factors related to how tasks and responsibilities are distributed among employees within the organization	5	
	Job Characteristics - Structuring of work	Factors related to design and organization of job roles and workflows influencing workplace learning	63	
Meso				27
	Learning Activity/Tool	Characteristics of tools and technologies and the design of learning activities influencing workplace learning	27	
Macro				128
	Workplace Climate	Organizational factors shaping the learning environment	111	
	Organization Characteristics	Organizational structure shaping learning	13	
	Broader Context	Factors related to national context of an organization and employment system	4	
Grand Total				348

The outcome variables associated with these antecedents were also grouped into categories, yielding the following distribution: 6 outcomes grouped *to formal workplace learning*, 175 to *informal workplace learning*, 34 to *work-related learning*, and 133 to *workplace learning*.

In terms of the relationship between the independent and dependent variables, 239 dependent variables were identified as enablers or correlates of the dependent variable categories (formal workplace learning, informal workplace learning, work-related Learning, and workplace Learning). Conversely, 53 were classified as constraints, while 56 relationships were found to be non-significant upon examination.

In terms of research methodology, the majority of the articles (N=40) utilized quantitative methods (QN), while qualitative methods (QL) were employed in 12 articles. A smaller proportion (N=4) adopted mixed-methods (MM) approaches. Table 2 presents the descriptive details of the included studies.

Table 2

Descriptive Details of the Included Studies

Study characteristics	Numbers	Percentage
Year of publication		
2012-2014	8	14%
2015-2017	9	16%
2018-2020	9	16%
2021-2024	30	54%
Method		
Quantitative	4	7%
Qualitative	12	21%
Mixed-methods	40	71%
Continent		
Asia	10	18%
Australia	1	2%
Europe	36	64%
North America	6	11%
South America	1	2%
Global	2	4%
Total	56	

The following sections present a comprehensive analysis of the literature review findings. We begin with Table 3, which summarizes the distribution of facilitators across the micro, meso, and macro levels, including the corresponding subcategories and the number of facilitators within each. For additional details and more comprehensive distinctions among the categories, subcategories, and all facilitators, refer to Table A1 in the Appendix.

Table 3

Distribution of Facilitators within the Subcategories

Micro	No.	Meso	No.	Macro	No.
Demographics	15	Learning Activity characteristics	6	Structure	4
Job details	3	Engaging in Learning activity	5	Sector	2
Personal situation	1	Learning tool access	12	Size	1
Attitudes/ Orientation	25			HRM Practices	6
Believe in ability	5			Learning climate	19
Personal traits	14			Leadership	24
Skills/ Competence	8			Possibilities for knowledge sharing and retention	17
Value	1			Social Setting	7
Job autonomy	11			Safety	1
Job demands	7			Company Orientation	2
Amount of change	2			Organizational Change	4
Stability and security	6			Culture	1
Job/ Task design	14			Employment system	1
Motivation	5			Geographical factors	1
Opinion and Perception	7			Industry	1
Time	1				
Total	**125**		**23**		**91**

4.1 Micro-level Facilitators

Among the 193 micro-level variables, 126 were identified as enablers or correlates of workplace learning, 29 as barriers, and 38 showed no significant relationship.

At the micro level, three key categories emerge: sociodemographic characteristics (N=38), individual attributes (N=87), and job characteristics (N=68). In the following line each of the

workplace learning facilitators and the way that influenced the dependent variables are discussed in detail.

4.1.1 Sociodemographic Characteristics

This category is divided into three main subcategories: demographics, job details, and personal situation.

4.1.1.1 Demographics

The antecedents related to this category are gender, level and type of education (vocational or general degree).

Gender

Eight studies examined *gender* differences in workplace learning, with seven finding correlations between gender and learning activities, facilitators, and barriers. In Northern Europe, women participate more in learning activities (Tikkanen & Nissinen, 2018), while in the U.S., they score lower in field-based learning (Wolfson et al., 2018). In Canada, however, IWL rates are similar across genders (Livingstone & Raykov, 2017).

Regarding learning strategies, women engage more in IWL through collaboration and feedback-seeking (Doyle et al., 2012), whereas men rely more on task-based challenges (Schürmann & Beausaert, 2016). Additionally, men tend to pursue hard-skill training more often, whereas women favour soft-skill training (Schultheiss & Backes-Gellner, 2023). Men also report greater dissatisfaction with barriers such as time constraints and training quality (Doyle et al., 2012). Despite these differences, both genders acknowledge feedback and a commitment to learning as key drivers of workplace learning (Schürmann & Beausaert, 2016).

Level and Type of Education

Six studies highlight the impact of *educational level* on workplace learning, indicating that higher education enhances workplace learning (Castano-Munoz et al., 2017; Livingstone & Raykov, 2017). In Sweden, employees with higher education participate more in IWL, whereas in Denmark and the UK, lower-educated workers do not necessarily fall behind, suggesting occupational selection plays a role (Aspøy, 2020). Higher education correlates positively with workplace learning intensity but slightly negatively with feedback-seeking (Crans et al., 2022; Ferreira et al., 2018).

Comparing *vocational and general degree* holders, those with vocational credentials initially exhibit slower skill development and lower training participation, though these gaps narrow with more work experience (Tobback et al., 2024).

4.1.1.2 Job Details

Seven studies tested *tenure* and six of them found that it influences workplace learning. However, one study found no significant relationship (Wolfson et al., 2018). In five studies, longer *tenure* is identified as a barrier to workplace learning and feedback-seeking (Crans et al., 2022; Ferreira et al., 2018; Wang & Zhang, 2022). For temporary agency workers, shorter *tenure* correlates with increased job challenges, which can enhance IWL (Preenen et al., 2015); Schürmann and Beausaert (2016) found that employees with shorter tenures (under two years) show stronger commitment to development, with interactions, support, and feedback promoting their learning. Only one study (Zia et al., 2023) highlighted longer *tenure* as an enabler of IWL, with more knowledge sharing, self-experimentation, and environmental scanning.

4.1.1.3 Personal Situation

One research focusing on personal situations reveals that *class or social background* influences engagement in job-related learning, with individuals from higher economic classes typically pursuing additional development more frequently (Livingstone & Raykov, 2017). Additionally, Tikkanen and Nissinen (2018), investigated the effect of another personal situation factor, *health*, and found no noticeable effect on employees' participation in job-related learning.

4.1.2 Individual Attributes

Individual attributes emerged as a key antecedent category (N = 65), encompassing attitudes and orientations towards learning (N=25), beliefs in one's abilities (N=5), motivation (N=5), opinion and perception (N=7), personal traits (N=14), existing skills and competencies (N=8), and personal values (N=1).

4.1.2.1 Attitudes and Orientations

20 of the studies identified various individual attitudes and orientations—including learning attitudes, self-directed learning orientation (SDLO), goal setting, work engagement,

organizational commitment, reflection, deliberation, and relatedness—as key facilitators of workplace learning.

Five studies indicate that *personal learning attitudes* significantly influence workplace learning, with proactive strategies such as trial-and-error problem-solving, reflection, and formal study enhancing engagement (Lee & Tan, 2023). Seeking feedback from supervisors, colleagues, and customers further supports continuous learning (Amenduni et al., 2022). A *positive learning attitude* correlates with higher learning intensity (Ferreira et al., 2018) and vocational skill development (Pylväs et al., 2018). Additionally, the *pursuit of knowledge work* exerts a positive effect on self-directed learning, suggesting that employees who engage in more complex and intellectually demanding tasks are more likely to take initiative in skill development (Raemdonck et al., 2012).

Four studies identify *SDLO* as a key driver of informal workplace learning. Employees with higher *SDLO* scores take greater responsibility for their development (Raemdonck et al., 2014), engage more in informal learning (Decius et al., 2023; Lejeune et al., 2016), and extend learning beyond organizational demands (Lejeune et al., 2023). This effect is particularly evident among blue-collar workers, who must actively recognize and seize learning opportunities in repetitive tasks (Decius et al., 2021).

Goal Setting is discussed in three studies. A *learning goal-oriented* workplace fosters informal learning by emphasizing continuous improvement over perfection (Decius et al., 2021). Such environments enhance proactive behaviour, supporting sustained performance and development (Theis & Bipp, 2020). *Setting personal work goals* further strengthens initiative and skill application (Wang & Zhang, 2022). *Mastery-oriented goal setting*, focusing on personal growth rather than outperforming others, leads to higher engagement, deeper reflection, and better learning outcomes, especially in self-regulated training (Jiang et al., 2023).

Similarly, *engagement* emerged as a critical factor (Pylväs et al., 2018), with *work engagement* and involvement in work processes consistently associated with IWL and IWL activities such as feedback-seeking from leaders and peers (Chen et al., 2023). Empirical evidence suggests that *organizational commitment* is positively associated with competence development activities (Ok & Vandenberghe, 2016).

Reflection and *deliberation* are vital for professional learning, as they help individuals assess and plan their development (Shahlaei & Lundh Snis, 2023). While *reflection* offers immediate insights through brief self-evaluation, *deliberation* involves structured planning and sustained analysis, leading to deeper skill acquisition.

Relatedness, or an employee's sense of connection and belonging, positively influences workplace learning. Employees with *strong affiliative bonds* and *supervisor support* show higher motivation to learn (Gao et al., 2022). Additionally, promotion-focused individuals, driven by career advancement, are more likely to engage in informal learning, particularly through vicarious learning and experimentation, while prevention-focused individuals show no significant learning tendencies (Wolfson et al., 2018).

On the other hand, the finding by Hilkenmeier et al. (2021) highlight that *work-related attitudes* and learning-related beliefs influence formal and informal learning differently. While participation in formal learning is shaped by conscious attitudes and planned behaviours, informal workplace learning—often unintentional—is less dependent on these beliefs.

4.1.2.2 Believe in Ability

Six studies examined the role of *self-efficacy* in workplace learning, with positive correlations of varying strength. Two studies reported a modest but positive relationship, with occupational *self-efficacy* correlated to both informal and organized learning (Amenduni et al., 2022). While confident learners exhibited *self-efficacy*, its influence on IWL was minor (Schürmann & Beausaert, 2016). Four articles found a significant positive relationship. *Self-efficacy* enhances IWL (Lee & Tan, 2023; Zia et al., 2023) and facilitates KSAOs acquisition (Van Hootegem et al., 2022). It also supports formal and informal learning through SDL, as individuals leverage their confidence to take initiative (Lejeune et al., 2023).

Only one article (Preenen et al., 2015) investigated *self-profiling*—the promotion of one's expertise and skills—among temporary agency workers, finding a modest positive link to informal learning, implying that greater confidence in one's own competences may enhance how effectively those skills are conveyed. The authors further suggest that higher levels of *self-profiling* might lead supervisors to assign more challenging tasks, given their perception of these workers as both capable and motivated to develop.

4.1.2.3 Motivation

Motivation is a critical antecedent of workplace learning across six studies. While the *personal motivation to attend training* has a modest effect on IWL (Amenduni et al., 2022), broader motivational needs—referred to as the "*driver domain*"—significantly enhance work-related learning participation while mitigating amotivation and associated barriers (Gao et al., 2022). *Autonomous motivation* within self-directed learning facilitates both formal and informal learning (Lejeune et al., 2023), directly stimulating IWL through intrinsic drives and indirectly fostering commitment to learning (Schürmann & Beausaert, 2016). *Career motivation*, which reflects an employee's drive for growth and advancement, further strengthens IWL, showing positive correlations with staying up-to-date, seeking feedback, and knowledge sharing (van Rijn et al., 2013). Additionally, *motivation* is correlated to informal learning strategies such as knowledge sharing, experimentation, and environmental scanning (Zia et al., 2023).

4.1.2.4 Opinion and Perception

Eight studies indicate that employees' opinions and perceptions play a central role in shaping workplace learning. *Perceived job insecurity* has a dual impact on workplace learning engagement. In changing work environments, employees may become increasingly aware of the necessity of continuous learning (Amenduni et al., 2022). Conversely, *qualitative job insecurity* has been associated with reduced levels of information-seeking and feedback-seeking behaviours from supervisors and colleagues (Van Hootegem & De Witte, 2019). Furthermore, *perceived internal employability* is positively associated with work-related learning. Employees who believe they have strong internal career prospects are more likely to engage in learning opportunities (Houben et al., 2021).

Employees' perceptions of their organization's learning culture also play a significant role in fostering workplace learning. Support from co-workers and supervisors, along with opportunities for cross-boundary collaboration, has been found to enhance participation in learning activities (Hilkenmeier et al., 2021).

Satisfaction with formal training emerges as a key driver of continued engagement in informal learning. Employees who find training programs fulfilling are more likely to explore training content independently. This curiosity encourages them to apply new knowledge in

unstructured settings, ultimately improving their skills and overall learning experience (Richter et al., 2020). Additionally, *satisfaction* with tasks (Schürmann & Beausaert, 2016) and job (Tikkanen & Nissinen, 2018) has been shown to promote IWL.

Finally, *self-construal*—how employees perceive themselves individually, relationally, or collectively—correlates with knowledge sharing, feedback-seeking, and staying up-to-date with industry trends (van Rijn et al., 2013).

4.1.2.5 Personal Traits

10 studies highlight the role of personal and interpersonal traits in workplace learning. Studies point to *curiosity* (Decius et al., 2021) , *proactive personality* (Ok & Vandenberghe, 2016; Raemdonck et al., 2012; Yang et al., 2022) , and *growth potential* (Raemdonck et al., 2012) as drivers for informal and self-directed learning, with *proactive personali*ty also correlated to competence development, feedback-seeking, and reflective learning. *Perfectionism* similarly emerges as an antecedent; employees who demand high standards of themselves report intensive engagement in IWL (Schürmann & Beausaert, 2016).

Alongside these personality-related antecedents, *situational awareness* and *relational agency* promote knowledge-sharing and collective problem-solving, particularly in team-based or safety-oriented environments (Yap & Choy, 2018). Finally, *job crafting*—whether cognitive, task, or relational—exerts a statistically significant effect on informal learning, highlighting the importance of personal traits in skill development (Yim & Park, 2023).

4.1.2.6 Skills and Competence

Seven studies highlight the role of digital and foundational skills in workplace learning. *Digital competence* supports MOOC enrolment (Castano-Munoz et al., 2017), while *numeracy* and *knowledge acquisition* correlate with IWL intensity (Ferreira et al., 2018; Decius et al., 2023). *Literacy*, *numeracy*, and *problem-solving* influence job-related learning, with the specific association varying by national context (Tikkanen & Nissinen, 2018).

Advanced competencies, such as *technological knowledge competences* have been shown to strengthen organizational learning, suggesting that employees who build these proficiencies can more effectively contribute to collective development (Lardón-López et al., 2022). Employees who are *motivated* to progress in their careers and possess the necessary

competencies and adaptability appear to engage more actively in workplace learning (Gao et al., 2022; Preenen et al., 2015).

4.1.2.7 Value

Only one study examined the influence of *value systems* on workplace learning. This qualitative study, McPherson and Wang (2014), focused on low-income, low-qualified employees in small organizations and emphasized the pivotal role of value systems—shared by both employees and business owners—in influencing the creation and accessibility of workplace learning opportunities. Overall, this study highlights that employer-employee value alignment can promote workplace learning in small organizations. The study's findings indicate that supervisors are inclined to offer greater support when subordinates' values match organizational norms.

4.1.3 Job Characteristics

Based on the categorization by Kyndt et al. (2018), job characteristics are divided into two main subcategories: allocation of work and structuring of work.

Allocation of Work pertains to how tasks and responsibilities are distributed among employees within the organization. Structuring of work involves the design and organization of job roles and workflows. Analysing the literature revealed several key subcategories within this domain: job autonomy (N=14), job demands (N=13), amount of change (N=3), stability and security (N=12), and job /task design (N=18).

4.1.3.1 Job Autonomy

Eleven studies examining job autonomy as an antecedent of workplace learning have produced mixed findings. Eight of these studies identified job autonomy as a facilitator of workplace learning, highlighting factors such as greater decision latitude (Decius, Knappstein, et al., 2023), flexible work roles (Coetzer et al., 2023) autonomy support (Amenduni et al., 2022), and career control (Preenen et al., 2015) as key drivers of IWL. However, other studies reported only minor (Raemdonck et al., 2014) or no significant effects (Tikkanen & Nissinen, 2018). Decius, Schaper, et al. (2023) found no correlation between job control and IWL among blue-collar workers, suggesting that contextual factors such as role demands and available support moderate this relationship. Moreover, job control may indirectly enhance learning through task

or relational crafting (Decius, Schaper, et al., 2023). However, one study showed that apprentices with high autonomy sometimes lacked adequate guidance (Preenen et al., 2015). Overall, the effectiveness of autonomy depends on occupational context, guidance mechanisms, and individual initiative.

4.1.3.2 Job Demands

Nine studies investigating *job demands* as an antecedent of workplace learning yield mixed yet insightful findings. While five studies identify a significant correlation between job demands and workplace learning, two highlight them as constraints, and three report no significant relationship.

High workloads and *demanding tasks* are positively correlated to IWL, prompting employees to seek knowledge and develop new skills (Amenduni et al., 2022; Decius, Knappstein, et al., 2023; Raemdonck et al., 2014). *New task challenges* and *task complexity* have a positive impact on IWL, as they help employees stay up-to-date with evolving job requirements while fostering problem-solving, knowledge expansion, and experiential learning (Schürmann & Beausaert, 2016). *Organizational expectations* further drive workplace learning by encouraging employees standards (Schürmann & Beausaert, 2016; Wang & Zhang, 2022).

However, in round-the-clock work environments, organizations often struggle to provide formal learning opportunities, and excessive workload or responsibility may constrain rather than enhance learning (Parding et al., 2023; Pylväs et al., 2018).

4.1.3.3 Amount of Change

Two studies suggest that *job and industry changes* influence workplace learning. While tasks that frequently evolve and demand new skill set can drive IWL (Schürmann & Beausaert, 2016)rapid innovation—such as in digitalized engineering—creates both learning opportunities and frustration due to limited reflection time and reduced reliance on prior knowledge (Shahlaei & Lundh Snis, 2023). Thus, while *change* fosters skill development, excessive disruption may hinder learning by limiting opportunities for reflection and deliberate practice (Shahlaei & Lundh Snis, 2023).

4.1.3.4 Stability and Security

One study (Tikkanen & Nissinen, 2018) identified income as a positive significant antecedent of workplace learning. Their large-scale study (N = 1,172) suggests that higher-income employees are better positioned to invest in their professional development through workplace learning.

4.1.3.5 Job /Task Design

Nine studies highlight job and task design as key antecedents of workplace learning. *Task interdependence* in small businesses fosters both formal and informal learning (Coetzer et al., 2023), while *task variety* enhances feedback seeking, information sharing (Froehlich et al., 2019), and self-directed learning (Raemdonck et al., 2012).

Job characteristics such as *temporary contracts*, *longer work hours*, *and high-skilled roles* increase IWL intensity (Ferreira et al., 2018). Employees engage more in learning when tasks are interesting (Schürmann & Beausaert, 2016), with hard-skilled workers and line managers participating more in job-related training (Schultheiss & Backes-Gellner, 2023; Tikkanen & Nissinen, 2018).

Job demands and social support interact, as employees with high demands but low support exhibit greater workplace learning (Raemdonck et al., 2014). Additionally, *job transitions* facilitate skill acquisition, emphasizing the role of dynamic work environments in workplace learning (Van Hootegem et al., 2022).

4.2 Meso-level Facilitators

4.2.1 Activity/Tool Characteristics

Among the 27 meso-level variables, 23 were identified as enablers or correlates of workplace learning, one as barriers, and 3 indicated no significant relationship.
This level is further divided into three subcategories: activity characteristics (N=7), engagement in learning activities (N=6), and tool characteristics (N=14).

4.2.1.1 Learning Activity Characteristics

Activity characteristics are important antecedents of workplace learning. Two studies investigated *personal development plans* (PDPs) as a means of aligning employees' goals with organizational needs. Lejeune et al. (2016) note that PDPs integrate learning and reflection,

instruction and feedback, and a motivating supervisor, with regular checkpoints that build trust, deepen relationships, and promote reflective practice—factors that significantly predict engagement in learning. A more recent study (Lejeune et al., 2023) further indicates that PDPs foster ongoing dialogue on development goals and sustain a learning focus over time, enabling managers and HR practitioners to flexibly guide employee development while offering continuous learning opportunities.

Similarly, Jiang et al. (2023) demonstrate that *well-structured interventions*, such as *setting mastery goals*, can enhance workplace learning more effectively than performance-oriented goals or no goal setting. In contexts where employees self-regulate their learning, mastery goals promote a stronger commitment to continuous improvement. Trainees adopting mastery goals not only achieve higher performance scores but also devote more time to deeper learning activities, such as reflective practice, underscoring that a focus on personal growth more effectively motivates sustained engagement.

4.2.1.2 Engaging in Learning Activity

Three studies indicate that purposeful engagement in various activities can significantly enhance workplace learning. Mullin (2013) describes *e-learning* as providing a “fresh eyes” perspective and sustainable support by connecting employees with external *communities of practice*, thereby fostering new insights and stimulating discussions on development opportunities. Similarly, Schürmann and Beausaert (2016) find that *formal training* catalyses IWL by encouraging the application of new competencies and the formation of professional relationships. Additionally, Yap and Choy (2018) demonstrate that *mutual appraisal*, particularly in safety contexts, promotes dialogic learning and collaboration by facilitating a better understanding of colleagues’ work practices and objectives.

4.2.1.3 Learning Tool Access

Five studies highlight the impact of technological and design features on workplace learning. *Micro-learning modules* enhance declarative knowledge of informal learning strategies, though their direct influence on strategy use remains inconclusive, likely due to limited guidance, training duration, or contextual factors (Kittel & Seufert, 2023).

Beyond micro-learning, *user-friendly applications* and *communication platforms* support self-directed and social learning (Lee & Tan, 2023). *Social media* enhances technological competencies and correlates with organizational learning (Lardón-López et al., 2022), while *augmented reality* fosters peer communication and problem-solving (Pejoska et al., 2016). *Carefully designed e-learning* resources, mindful of session length and distractions, further sustain engagement and motivation (Mullin, 2013).

4.3 Macro-Level Facilitators

Among the 128 macro-level variables, 91 were identified as enablers or correlates of workplace learning, 22 as barriers, and 15 showed no significant relationship.

Macro-level facilitators of workplace learning can be grouped into three categories: organizational characteristics (N=13), workplace climate (N=111), and the broader context (N= 4).

4.3.1 Organization Characteristics

4.3.1.1 Structure

Four articles examined how antecedents related to organizational structures influence workplace learning. Small businesses with *simple organic structures*—characterized by fewer hierarchical layers and flexible communication—tend to facilitate both formal and informal learning (Coetzer et al., 2023). Additionally, enterprise-oriented strategies that offer *training opportunities*, *financial support*, and *high-quality training* consistently promote employees' skill acquisition and engagement (Lee & Tan, 2023). In contrast, *staffing levels* do not significantly affect informal field-based learning, indicating that workforce size alone does not determine learning effectiveness (Wolfson et al., 2018).

4.3.1.2 Sector and Firm Size

Three studies reveal nuanced effects of organizational *size* and *sector* on workplace learning. Ferreira et al. (2018) indicate that *larger firms* exhibit higher informal learning intensity, although the *industry* appears unrelated. In contrast, Tikkanen and Nissinen (2018) report no significant effect of *firm size* on job-related learning in Nordic countries, while noting that public-sector employees engage in such learning nearly 20% more than others.

Additionally, Raemdonck et al. (2012) states that the *type of sector* plays a pivotal role in predicting self-directed learning. They report that within some specific production sectors, such as in the chemical industry, blue-collar workers exhibit higher levels of self-directed learning compared to those in other sectors, such as the food industry. This finding is attributed to more stringent recruitment practices, which select employees better suited to handle the inherent risks of chemical production, and to the availability of both formal and informal learning opportunities.

4.3.2 Workplace Climate

4.3.2.1 HRM Practices

Four studies on HRM practices show that deliberate organizational measures support workplace learning. Organizational support for learning and the active organization of training enables employees to build and refine job competencies (E. Kyndt et al., 2013). Additionally, flexible working arrangements, as part of broader enterprise-oriented strategies, promote learning participation through adaptable scheduling and easier access to courses (Lee & Tan, 2023). At the policy level, supportive learning policies empower employees to manage their development, thereby enhancing self-directed learning (Raemdonck et al., 2012). Overall, proactive HRM practices create a structured yet adaptable environment that fosters progressive, work-related learning (Shahlaei & Lundh Snis, 2023).

4.3.2.2 Learning Climate

Fifteen studies have examined how learning climate antecedents shape workplace learning. A *supportive organizational culture* that values learning fosters continuous skill enhancement (McPherson & Wang, 2014), while engaging environments—with a *shared language*, *collective efficiency*, and *common knowledge base*—promote tacit knowledge sharing (Nakano et al., 2013). Specifically, *facilitation and appreciation learning climates* show significant positive relationships with employees' KSAOs, whereas error-avoidance and non-punitive climates do not directly enhance IWL (Nikolova et al., 2016; Wolfson et al., 2018).

Additionally, *team task support* modestly contributes to reflective learning (Yang et al., 2022). These findings suggest that a strong *learning climate* combines structural elements, such as e-learning tools (Mullin, 2013) and supportive policies, with socioemotional factors, including

good working relationships (Lee & Tan, 2023), participative interaction (Pylväs et al., 2018), and appreciation for skill growth (Nikolova et al., 2016). This integration fosters open dialogue, employee development, and reflective experimentation.

Furthermore, an interaction between *self-directed learning orientation (SDLO) and social support* reveals that workers high in both exhibit the most pronounced learning behaviours, underscoring the interplay of individual dispositions and contextual support (Raemdonck et al., 2014). Finally, *upward social comparison* enhances IWL by eliciting benign envy—a process further moderated by psychological availability, which strengthens the indirect correlation between social comparison and IWL (Li & Wang, 2023).

4.3.2.3 Leadership

Twelve studies indicate that various leadership behaviours and styles play a central role in fostering workplace learning. For example, *leader gratitude expression* is associated to increased feedback-seeking and IWL (Chen et al., 2023). From a developmental perspective, leadership that *provides advice*, *feedback*, and *emotional support* enhances employees' feedback-seeking and reinforces closer working relationships, while *practical support* (e.g., time, resources, and reflection opportunities) further promotes direct feedback-seeking behaviours (Crans et al., 2022). Similarly, *manager physical and social closeness*—including modelling influences, regular feedback, accessible support, and encouragement—along with *participative and supportive management styles*, facilitate both formal and informal learning (Coetzer et al., 2023; Schürmann & Beausaert, 2016). Moreover, *managers who create fun work environments*, *promote autonomy*, *and offer structured challenges* foster self-directed learning and innovative performance (Lee & Tan, 2023; Lejeune et al., 2023).

Additionally, *workplace trainers' skills* to organize learning opportunities and guide apprentices are integral to learning (Pylväs et al., 2018). Finally, supervisor support—through *developmental feedback* (Wang & Zhang, 2022) and *effortful leadership* (Yap & Choy, 2018)—remains a key driver of enhanced learning processes, knowledge sharing, and reflective practices (Sijbom et al., 2024).

4.3.2.4 Possibilities for Knowledge Sharing and Retention

Nine articles identified antecedents that could be in the category the possibilities for knowledge sharing and retention. *Small business characteristics*—such as help- and feedback-seeking behaviours and open communication—facilitate learning via both structured and ad hoc interactions among employees (Coetzer et al., 2023). Socially leveraged strategies, including *support from helpful colleagues* (Lee & Tan, 2023), *experienced trainers* (Mullin, 2013), and collaboration during tasks (Lejeune et al., 2023)further enhance employees' ability to exchange and retain knowledge.

Additionally, *guidance and feedback from experienced workers or mentors* drive deeper engagement and reflective practice (Pylväs et al., 2018; Schürmann & Beausaert, 2016), while *interactions, support, and networks* create dynamic environments for information sharing and joint problem-solving (Schürmann & Beausaert, 2016). Similarly, factors such as *shared language* and a *common knowledge base* promote tacit knowledge sharing, and *open, trusting communication* along with *group assimilation* contribute to safety and mutual learning (Nakano et al., 2013). Finally, in Hovens (2020) *machine-human interaction* emerges as a compensatory communicative avenue when traditional human-human exchanges are constrained, allowing newcomers and experts to develop work practices despite limited linguistic overlap.

4.3.2.5 Social Setting

Five studies on social settings as antecedents to workplace learning show that both interpersonal and social dimensions shape employee development. *Opportunities for social interaction*—particularly spaces for modelling and vicarious feedback and connectivity—strongly support IWL (Amenduni et al., 2022). In terms of interpersonal dynamics, *social support*, including *supervisor and co-worker backing* and an *error-related learning climate*, promotes IWL (Decius et al., 2021), and *workplace fun* through activities, *socializing*, and *friendships* further enhances learning (Lee & Tan, 2023). Although colleague acceptance plays a minor role (Schürmann & Beausaert, 2016), overall *social support* remains a significant predictor of workplace learning (Raemdonck et al., 2014). In high-risk contexts, *a sense of family* fosters empathy and vigilance, reinforcing intentional safety learning (Yap & Choy, 2018).

4.3.2.6 Safety

Schürmann and Beausaert (2016) was the only study to directly examine a safety-related construct, finding that a *psychologically safe workplace*—where employees feel unafraid to make mistakes or ask questions—encourages exploration, reflective practice, idea-sharing, and feedback-seeking, thereby fostering IWL.

4.3.2.7 Company Orientation

Amenduni et al. (2022) found that organizational *rewards* have only a minor influence on employees' perceptions of learning support, affecting both informal and organized informal learning. They observed that *different organized IWL approaches*—passive, active, reflective, constructive, and interactive—exhibit varied relationships with learning outcomes. Notably, the *passive approach*, despite its strong association with learning support, is the only method correlated to inhibited learning under certain conditions. These findings suggest that while a passive strategy may facilitate engagement with learning resources, it can also constrain learning if not guided by additional supportive practices.

4.3.2.8 Organizational Changes

Three studies examined how organizational changes impact workplace learning. Shahlaei and Lundh Snis (2023) found that *technology-related shifts* prompt employees to adapt and engage in work-related learning. Sijbom et al. (2024) observed distinct patterns: formal learning participation initially increases but eventually plateaus if *too many changes* occur simultaneously, whereas IWL steadily grows with ongoing change. Van Hootegem et al. (2022) further indicate that *organizational transitions* catalyse the acquisition of new KSAOs, fostering competency development.

4.3.3 Broader Context

Three studies underscore that *national employment regimes*, *geographic contexts*, *sector-based demands*, and *cultural capital* shape workplace learning opportunities. In social democratic systems like Norway, workers experience higher levels of IWL than in more liberal regimes such as the UK and Ireland, though variations exist across educational groups and occupations (Aspøy, 2020). Beyond systemic differences, geographical factors—for instance, working in remote, cold regions with shrinking and aging populations—pose additional hurdles

to organizing and delivering both formal and informal learning (Parding et al., 2023). *Sector-based factors* also play a pivotal role, with industry-specific challenges dictating the scope, methods, and resources available for workplace development (Parding et al., 2023). Finally, *cultural capital* matters; for example, in Sweden, parental education is correlated to disparities in job-related learning (Tikkanen & Nissinen, 2018). Collectively, these findings emphasize the importance of macro-level and cultural conditions in shaping employee engagement with learning processes.

4.4 Micro-Level Barriers

This section introduces the barriers to workplace learning by categorizing them into three distinct levels—micro, meso, and macro. Table 4 presents a summary of the distribution of these barriers across the subcategories. Additional details and a more comprehensive delineation of the categories, subcategories, and all barriers are presented in Table A2 in the Appendix.

Table 4

Distribution of the Barriers within the Subcategories

Micro	No.	Meso	No.	Macro	No.
Sociodemographic	8	Engaging in learning activity	1	Structure	3
Job details	3			HRM practices	1
Attitudes/ Orientation	3			Learning climate	8
Personal traits	1			Leadership	1
Skills/ Competence	1			Possibilities for knowledge sharing and retention	6
Job demands	2			Company Orientation	1
Amount of change	1			Organizational change	2
Stability and security	5				
Job/ Task design	1				
Time	5				
Total	**30**		**1**		**22**

4.4.1 Sociodemographic Characteristics

Nine studies reveal that sociodemographic factors—such as *age*, *tenure*, and *nationality*—might pose barriers to workplace learning. Seven studies on age indicate that older

employees are less likely to seek feedback (Crans et al., 2022) and engage in IWL (Decius, Knappstein, et al., 2023; Zia et al., 2023), although Ferreira et al. (2018) suggest a quadratic relationship with a dip near retirement, while Houben et al. (2021) and Livingstone and Raykov (2017) report only modest declines. Tikkanen and Nissinen (2018) suggest that the negative effect of age on job-related learning may vary across Nordic countries. Notably, a negative relationship with age was found only in Norway.

Three studies tested *tenure* and their findings show that longer tenure is associated with reduced feedback usage and lower IWL intensity (Crans et al., 2022; Ferreira et al., 2018), though it does not necessarily dampen the tendency to seek feedback outright (Crans et al., 2022). Also, Wang and Zhang (2022) indicates that *greater work experience* can also negatively correlate with workplace learning behaviours.

Turning to *nationality*, one study (Preenen et al., 2015) found that non-Dutch respondents reported higher levels of self-profiling and IWL than Dutch participants, suggesting cultural or contextual differences in learning approaches.

4.4.2 Individual Attributes

Two studies highlight how individual attributes can hinder workplace learning. Lee and Tan (2023) suggest that *knowledge gaps* impede employees' ability to absorb and apply new information. A qualitative study, McPherson and Wang (2014), found that low-qualified employees often devalue learning and achievement, which reduces their motivation to upskill. This study shows that employees *lacking clear goals and ambition* are less inclined to develop, while *resistance to change* and *failure to comprehend implicit organizational expectations* further constrain learning opportunities. These barriers collectively reduce motivation, hinder active participation, and narrow the pathways through which employees can access and benefit from workplace learning.

4.4.3 Job Characteristics

Four studies indicate that some job characteristics can hinder workplace learning. Ferreira et al. (2018) show that *mismatches in education-job fit* reduce engagement in IWL—overeducated employees invest less while undereducated workers exhibit increased IWL. Beyond fit, the nature of *round-the-clock work* poses a barrier to formal workplace learning, as

constant operational demands leave little room for structured educational initiatives, such as external courses or scheduled training sessions (Parding et al., 2023). Also, *excessive responsibilities* constrain employees' ability to learn meaningfully (Pylväs et al., 2018). Finally, *rapid changes* within teams diminish opportunities for reflection, leading employees to perceive project delivery as distinct from learning (Shahlaei & Lundh Snis, 2023). Collectively, these findings reveal that misaligned roles, overburdening, and high-paced environments restrict effective workplace learning.

4.4.4 Stability and Security

Two studies on *job insecurity*—both qualitative and quantitative— show that it is correlated with lower engagement in work-related learning (De Cuyper et al., 2022; Van Hootegem et al., 2022).

Van Hootegem et al. (2021) indicates that the level of *job insecurity* (low, medium, and high) has different impacts on aspects of work-related learning. Findings on different job insecurity trajectories reveal that higher levels of job insecurity are associated with lower levels of work-related learning, while those with consistently low job insecurity maintain higher learning outcomes. In particular, employees who experience *increased qualitative job insecurity* tend to reduce their participation in both formal and informal workplace learning using environmental sources, presumably to safeguard existing resources (De Cuyper et al., 2022).

Finally, *transient work relations* further complicate matters by limiting the time available for newcomers to develop competencies and reducing experts' willingness to assist them, thereby hindering the potential for meaningful workplace learning (Hovens, 2020).

4.4.5 Time

Six out of seven studies on time indicate that *time constraints* largely hinder workplace learning. Multiple investigations reveal that limited time—whether in self-driven strategies, IT-enhanced initiatives, or day-to-day tasks—inhibits reflection and reduces learning opportunities (Shahlaei & Lundh Snis, 2023; Tikkanen & Nissinen, 2018). Likewise, a lack of time and resources impedes the provision of proper guidance to apprentices, as hectic schedules prevent mentors from devoting adequate attention to learners' development (Pylväs et al., 2018) and limit engagement with personal development plans (PDPs) (Lejeune et al., 2023). Notably, one study

found that moderate time pressure can weakly promote IWL behaviours (Decius et al., 2021). In contrast, working time did not significantly affect participation in job-related learning (Tikkanen & Nissinen, 2018), suggesting that broader systemic or organizational factors may exert a greater influence than schedule length alone**.**

4.5 Meso-Level Barriers

A significant barrier to workplace learning within the category of learning barriers related to tools is the lack of access to reliable technology (Mullin, 2013), such as computers and stable internet connections, which are essential for effective e-learning. Limited access to these tools can hinder employees' ability to engage in digital learning activities, reducing their opportunities for acquiring new knowledge and skills.

4.6 Macro-Level Barriers

4.6.1 Organization Characteristics and Workplace Climate

Nine studies on organizational characteristics and workplace climate identify multiple barriers that undermine workplace learning. Institutional obstacles such as *funding constraints* and *policy restrictions* hinder workplace learning (Gao et al., 2022). In settings with *limited human interaction*, employees struggle to build shared engagement, while machine-based tools may partially compensate, language diversity further complicates their effective use (Hovens, 2020). Limited accessibility to work practices hinders self-driven learning, while social-leveraged strategies, such as supervision and shared expertise, may fail *when time is scarc*e or *workplace cultures do not promote collaboration* (Lee & Tan, 2023). A *limited mindset* and *concerns about disrupting others* further reduce help-seeking and knowledge-sharing (Lee & Tan, 2023). At the enterprise level, *suboptimal training* programs and *restrictive learning environments* undermine motivation, and IT-driven strategies often fall short due to *generic content* and *insufficient guidance*, hindering the effective use of digital resources (Lee & Tan, 2023; Shahlaei & Lundh Snis, 2023).

Organizations with *high turnover* or staff shortages often find it difficult to systematically plan for learning, especially if senior employees—whose tacit knowledge is critical—are unavailable (Parding et al., 2023). Even participative interactions may be undermined if they depend too heavily on apprentices' self-regulation (Pylväs et al., 2018).

Additionally, *misalignments between HR assessments and frontline managers' ratings* reveal insufficient leadership training, while small businesses often face limited formal training and progression opportunities (Boehme et al., 2023; Coetzer et al., 2023). Finally, *limited collaboration between workplaces and vocational institutions* (Pylväs et al., 2018) and *a general lack of guidance* (Shahlaei & Lundh Snis, 2023) can compound these issues, leading to persistent gaps in workplace learning.

5. Discussion

The overarching purpose of this thesis is to synthesize the current research landscape regarding workplace learning in the context of blue-collar workers. More specifically, it seeks to identify which facilitators and barriers play a decisive role in shaping workers' learning behaviours, attitudes, and opportunities.

The following section presents a comprehensive analysis of the aggregated results on workplace learning mechanisms, categorized across the macro, meso, and micro levels.

5.1 Blue-Collar workers and workplace learning

Workplace learning is a multifaceted phenomenon that is deeply influenced by its contextual setting. To effectively promote workplace learning among blue-collar workers, it is crucial to identify and understand the contextual processes that can support their workplace learning. The following lines provide an overview of the nature of their work and the most effective strategies for fostering learning in such environments.

Scholars have identified Informal Workplace Learning as a pivotal approach to supporting blue-collar workers in manufacturing contexts, particularly in light of rapid technological changes and evolving skill requirements (Shahlaei & Lundh Snis, 2023). Unlike traditional training programs, IWL typically involves practical, experiential processes—such as experimentation, observation, feedback, and reflection—which align closely with the daily tasks of blue-collar workers (Decius et al., 2019). The fluidity of contemporary manufacturing, manifested in flexible production systems and highly individualized machine challenges, often renders real-time problem-solving more effective than standardized, formal routines.

Work environments for blue-collar workers are frequently characterized by repetitive, physically demanding tasks. These environments are less structured and lack fully documented procedures because it's too costly to record every detail (Nakano et al., 2013). Instead, these workplaces rely on the tacit knowledge of skilled workers. These workers must quickly address unpredictable and non-routine issues, like machine malfunctions or abnormal conditions, by making necessary adjustments (Nakano et al., 2013)Since these events vary and are hard to predict, it's impractical to document solutions for each one, so the knowledge remains within the workers themselves (Nakano et al., 2013). Under these conditions, peer learning, direct feedback, and hands-on experimentation are especially beneficial (Decius et al., 2019).

Although repetitive job tasks can limit learning opportunities if intrinsic motivation is lacking, many blue-collar workers display a readiness to adopt new processes that enhance efficiency and accommodate new technologies (Decius et al., 2021; Kyndt et al., 2013). Moreover, IWL can reduce the resistance that some low-qualified employees experience toward traditional classroom-based programs (Kyndt et al., 2013; Schröder & Dehnbostel, 2021). When feedback, reflection, and knowledge sharing are woven into workers' everyday activities, employees can significantly improve their knowledge and skills, deepen their understanding of operational procedures, increase their work speed and efficiency, operate multiple pieces of equipment, and bolster adaptability.

IWL also resonates with the inherently collaborative nature of shop-floor work. Shared workspaces allow for real-time exchanges of know-how, through both intentional advice-seeking and incidental interactions (Decius et al., 2021). For instance, mentors, supervisors, or peers may offer real-time pointers or corrections following a technical malfunction, ensuring that lessons are contextualized and immediately applicable (Nakano et al., 2013; Lejeune et al., 2023). Technology-based resources further amplify these learning moments by enabling workers to access relevant digital materials without interrupting workflows (Decius et al., 2021).

Several recent studies illustrate how blue-collar workers engage with IWL in varied ways. Lejeune et al. (2023) Identify a range of informal learning processes, including: (1) learning from others (Getting feedback from supervisors, co-workers, mentors, or friends); (2)

learning in real work situations by applying and testing new knowledge or techniques; and (3) learning from non-interpersonal sources (e.g., online platforms such as YouTube). Similarly, Decius et al. (2024) categorize four common types of IWL activities among blue-collar workers: testing individual solutions, sharing experiences, receiving feedback, and reflecting on work tasks.

Prior research emphasizes that IWL commonly unfolds through hands-on experimentation, reflection, observation, and feedback (Decius et al., 2019; Wolfson et al., 2018). Workers experiment with machine settings or production methods, assess the outcomes, and then refine their approaches to optimize quality and speed (Zhang & West, 2020). Given the frequent process changes and unpredictable operational demands in manufacturing, this iterative, experiential approach tends to be more flexible and cost-effective than formal training programs (Nakano et al., 2013; Decius et al., 2024).

Therefore, the tacit, experiential, and collaborative dimensions of IWL make it particularly suitable for blue-collar workers in manufacturing. By integrating learning opportunities into routine operational tasks, IWL leverages real-world shop-floor conditions to enhance adaptability, improve efficiency, and foster ongoing skill development in the face of continuous industrial transformation.

5.2 Micro level

Aggregating the results at the micro level indicate both individual attributes and job characteristics play a crucial role in shaping employees' workplace learning.

Individual attributes encompass various factors such as attitudes toward learning, motivation, and personal traits. Positive attitudes, including the commitment to learning (Lee & Tan, 2023; Schürmann & Beausaert, 2016), reflection (Shahlaei & Lundh Snis, 2023), self-directed learning orientation (Decius, Knappstein, et al., 2023; Decius et al., 2021; Lejeune et al., 2023; Raemdonck et al., 2014), and work engagement (Chen et al., 2023; Pylväs et al., 2018) influence how actively employees seek out developmental opportunities. Similarly, personal traits such as curiosity (Decius et al., 2021), proactive personality (Ok & Vandenberghe, 2016; Raemdonck et al., 2012; Yang et al., 2022), and job crafting (Yim & Park, 2023) drive individuals to take ownership of their learning processes. Beliefs in one's own abilities, such as self-efficacy (Lee &

Tan, 2023; Lejeune et al., 2023) and self-profiling (Preenen et al., 2015), further enhance this motivation by increasing confidence in handling new challenges and acquiring new skills.

On the other hand, job characteristics provide the structural conditions that either facilitate or hinder learning behaviours. For instance, job demands, such as task complexity and changing work requirements, act as natural triggers for experiential learning by pushing employees to adapt and grow (Decius, Knappstein, et al., 2023; Raemdonck et al., 2014; Schürmann & Beausaert, 2016) . Additionally, job design elements—such as task variety (Froehlich et al., 2019; Raemdonck et al., 2012), task interdependence in small businesses, and flexible work roles (Coetzer et al., 2023)—create opportunities for employees to engage in meaningful, day-to-day learning through practical experiences.

Ultimately, a supportive micro-level learning environment emerges when employees' internal motivations and competencies align with job conditions that encourage exploration, reflection, and skill development. In such environments, employees are more inclined to seize learning opportunities, resulting in continuous professional growth and adaptability in the workplace.

5.3 Meso Level

At the meso level, the findings highlight the critical role of well-structured learning activities and supportive technological tools in fostering workplace learning. Activity characteristics, such as interventions that incorporate various achievement goal orientations (e.g., mastery versus performance), enrich learners' motivation and focus by aligning objectives with their personal developmental trajectories (Jiang et al., 2023). Similarly, personal development plan (PDP) practices, which include instruction, feedback, and supervisor involvement, provide structured opportunities for reflection and goal-setting, promoting continuous improvement (Lejeune et al., 2023; Lejeune et al., 2016).

Engagement in learning activities—ranging from e-learning and communities of practice (Mullin, 2013) to formal training (Schürmann & Beausaert, 2016) and mutual appraisal (Yap & Choy, 2018)—creates diverse opportunities for employees to acquire and apply new knowledge in practice. Equally important, meaningful day-to-day work tasks emerge as powerful drivers of

experiential learning, reinforcing the idea that learning happens most effectively through practical, job-related experiences (Schürmann & Beausaert, 2016).

Furthermore, tool characteristics, such as user-friendly technology, and effective communication platforms (Lee & Tan, 2023) not only streamline access to information but also foster collaboration and real-time interaction. Interventions that combine micro-learning approaches with context-based prompts further enhance retention and encourage employees to integrate new insights into practice (Kittel & Seufert, 2023). Collectively, these meso-level antecedents illuminate how well-structured activities, supported by appropriate technological resources, can augment both the efficacy and sustainability of workplace learning.

5.4 Macro level

Drawing on the combined findings in the macro level**,** a comprehensive mechanism for supporting workplace learning emerges through the interplay of organizational practices, leadership behaviours, learning climate, and social structures. First, HRM practices (E. Kyndt et al., 2013)—such as active organization of learning processes (Shahlaei & Lundh Snis, 2023), and participatory policies (Raemdonck et al., 2012)—lay a structural foundation for learning by granting employees the necessary resources to engage in ongoing skill development. Concurrently, leadership approaches characterized by supportive and participative styles (Coetzer et al., 2023), and frequent developmental feedback (Wang & Zhang, 2022) or supervisory feedback (Zia et al., 2023) cultivate a psychologically safe environment (Schürmann & Beausaert, 2016), wherein employees feel empowered to experiment, seek guidance, and share knowledge.

A learning climate that promotes openness—such as through open communication (Nakano et al., 2013) and social support (Raemdonck et al., 2014)—and recognizes the importance of continuous learning (Mullin, 2013; Nikolova et al., 2016) fosters collective engagement in knowledge sharing. Encouraging participative interactions, where employees actively contribute to problem-solving (Pylväs et al., 2018), further strengthens this climate. Additionally, having a proactive organizational orientation toward change is critical (Sijbom et al., 2024). Providing sufficient support during times of transition and striking a balance between embracing new developments and reflecting on past changes to determine appropriate

responses can serve as powerful learning catalysts when accompanied by proper deliberation (Shahlaei & Lundh Snis, 2023).

Finally, social settings that emphasize strong interpersonal connections—such as social support (Decius et al., 2021) or workplace friendships (Lee & Tan, 2023)—combined with supportive organizational structures, including simple, organic frameworks (Coetzer et al., 2023) and quality training opportunities (Lee & Tan, 2023), help establish a community of practice (Mullin, 2013). These communities foster collaboration (Lejeune et al., 2023), shared learning, and knowledge creation (Coetzer et al., 2023), ultimately enabling workplace learning to occur naturally within the organizational culture.

5.5 Implications

In focusing on blue-collar roles within the production industry, this research offers a nuanced perspective that expands upon the foundational work by Kyndt and Baert (2013), while also responding to the broader call for more context-specific inquiries into workplace learning processes. In doing so, the findings contribute to ongoing discussions about how to nurture effective, continuous learning pathways that not only enhance workers' immediate job performance but also support their long-term professional growth.

A key implication for workplace learning is that fostering meaningful and sustainable learning cultures requires a multi-level approach that aligns macro-, meso-, and micro-level antecedents. Workplace learning does not occur in isolation at any one level but instead emerges from the interaction of broader policies, organizational structures, and individual characteristics. Macro-level factors, such as national policies, regulatory frameworks, and socioeconomic conditions, establish the broader context for learning, but leadership, HRM practices, and organizational culture help translate these conditions into clear structures, support systems, and environments that encourage continuous learning. At the micro level, individual attributes and job characteristics determine how employees engage with learning opportunities, based on their personality, motivation, self-efficacy, and the structure of their job roles.

This multi-level perspective implies that workplace learning initiatives must consider the alignment and interaction across all three levels to be effective. For instance, leadership

support and flexible HR strategies are more likely to foster meaningful learning behaviours if employees have both the motivational readiness and appropriate job structures to utilize them, and if national policies, regulatory frameworks, or market conditions do not unduly limit these efforts. In this sense, workplace learning must be approached as an ecosystem, where interventions at any one level influence and are influenced by the others. This highlights the importance of adopting comprehensive, system-wide strategies to create learning environments that drive both individual development and organizational success.

5.6 Limitations and Future Research

This literature review is subject to several limitations. Firstly, it exclusively includes empirical studies, thereby omitting potential antecedents discussed in the theoretical literature. Additionally, there is a significant limitation stemming from the inconsistent definitions and terminology for work-related learning across studies. For instance, some studies conflate formal and informal learning under umbrella terms such as “workplace learning” or “lifelong learning,” while others define elements of informal training in ways that may overlap with formal learning, such as structured lectures or organized self-learning programs. This inconsistency makes it challenging to clearly identify which type of learning an antecedent affects across the literature.

Future research should aim to develop a holistic theoretical model that explores the learning needs, experiences, and barriers encountered by blue-collar workers in workplace settings. Furthermore, qualitative methods—such as in-depth interviews, ethnographic observations, or case studies—could provide richer contextual insights into how employees in low-qualified roles transition from motivation or intention to actual learning behaviours.

A promising avenue for future research would be to design studies that move beyond cross-sectional, correlational analyses by employing longitudinal methodologies. For example, researchers could employ quasi-experimental designs in which specific interventions, like targeted mentoring programs or structured learning opportunities, are introduced in workplace settings. This would allow for the observation of changes in IWL over time and facilitate the testing of causal relationships between antecedents and learning outcomes. Understanding how blue-collar workers navigate learning opportunities, especially in industries marked by high

job instability or rapid technological change, could offer critical insights into designing more inclusive learning ecosystems.

Furthermore, future research should address the existing gap in the literature by exploring the specific mechanisms that can effectively support and promote workplace learning from an organizational perspective. Investigating these mechanisms could provide valuable insights into how organizations can enhance learning processes and optimize employee development in a more efficient and structured manner.

5.7 Conclusion

Ultimately, involvement in work-related learning is not a linear process but a dynamic interplay of individual, organizational, and job-related factors that shape the employee's learning journey. The study reveals that informal workplace learning is shaped not only by personal attributes such as motivation and ability, but also by how workplace structures, relationships, and opportunities interact with those personal factors to enable—or constrain—learning. Understanding this complexity can help organizations develop more targeted strategies to encourage participation in learning activities by addressing barriers at multiple levels and tailoring interventions to the specific needs of their workforce.

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Appendix

Table A1

Overview of Facilitators in Micro, Meso and Macro Levels within the Categories

	Micro	N		Meso	N		Macro	N
Sociodemographic Characteristic	**Demographics**	**15**	Learning Activity / Tool	**Learning Activity characteristics**	**6**	Workplace Climate	**Company Orientation**	**2**
	Age	1		Intervention with mastery goal setting	1		Organized informal learning approach	1
	Educational level	6		PDP practice: Instruction & feedback	1		Rewards	1
	Gender	6		PDP practice: Learning & reflection	1		**HRM Practices**	**6**
	Vocational degree or general degree	2		PDP practice: Motivating supervisor	1		Active organizing	1
	Job details	**3**		PDP use	2		Flexible working arrangements	1
	Tenure	3		**Engaging in learning activity**	**5**		Learning and career policy	1
	Personal situation	**1**		Access to e-learning	1		Organizational support for learning	1
	Class/social background	1		Formal learning	1		Organizing training activities	1
				Mutual appraisal	1		Participatory policy	1
Individual Attributes	**Attitudes/ Orientation**	**25**		Online communities of practice	1		**Leadership**	**24**
	Commitment to learning	1		Task and Job itself	1		Accessible support	1
	Deliberation	1		**Learning Tool Access**	**12**		Autonomy support	1
	Demonstrating initiative	1		Availability of communication within Social augmented reality	1		Being a role Model	1
	Dispositional learning goal orientation	1		Combined intervention (micro-learning + prompts)	2		Effortful leadership	1
	Exhibiting control of the learning situation	1		e-learning characteristics	1		Encouraging questions	1
	Learning attitudes	2		Effective communication platforms	1		Feedback	1
	Learning goal orientation	1		External online resources	1		Leader gratitude expression	3
	Learning related beliefs	1		Micro-learning intervention	1		Learning committed leadership and management	1
	Organizational commitment	1		Possibility to interact within social augmented reality	1		Learning leadership	1
	Personal IWL strategy	1		Prompts as intervention	1		Manager support for learning	1
	Promotion focus	1		Social media technologies	2		Modelling influences	1

Micro	N	Meso	N	Macro	N
Pursuit of knowledge work	1	User- friendly technology	1	Participative management style	1
Reflection	1			Providing developmental support	1
Relatedness	1			Providing emotional support	1
Self-directed learning orientation	4			Providing practical support	1
Self-goal setting	1			Supervisor developmental feedback	1
Work engagement	4			Supervisor feedback	1
Learning attitude	1			Supervisor support for learning	2
Believe in ability	**5**			Supportive management style	1
Self-efficacy	4			Workplace fun: Manager support for fun	1
Self-profiling	1			Workplace trainers' skills	1
Motivation	**5**			**Learning climate**	**19**
Career motivation	1			Appreciation learning climate	1
Motivation to learn	3			Benign envy	2
Driver domain	1			Engaging environment	1
Opinion and Perception	**7**			Facilitation learning climate	1
Job satisfaction	1			Finding points of reference	1
Perceived internal employability	1			Good working rapport	1
Perceived organizational learning culture	1			Learning being valued	1
Qualitative job insecurity	1			Participative interaction acknowledged and encouraged	1
Self-construal	2			Psychological availability	1
Training satisfaction	1			SDLO + Social support	1
Personal traits	**14**			Supportive culture for learning	1
Cognitive crafting	1			Supportive learning culture	1
Curiosity	1			Team task support	1
Future thinking	1			Upward social comparison	1
Growth potential	1			Work environment	1
Perfectionism	1			Work tools and resources	1
Personality	1			Workplace acknowledged as a learning environment	1
Proactive personality	4			Workplace learning goal orientation	1
Relational agency	1			**Organizational Change**	**4**
Relational crafting	1			Change and newness	1
Situational awareness	1			Organizational transition	1

	Micro	N	Meso	N	Macro	N
	Task crafting	1			Workplace change checklist	2
	Skills/ Competence	**8**			**Possibilities for knowledge sharing and retention**	**17**
	Competence	1			Collaboration	1
	Digital competence	1			Feedback	1
	Knowledge/skill acquisition	1			Group assimilation	1
	Literacy	1			Guidance available	1
	Numeracy skills	2			Help and feedback-seeking behaviours	1
	Problem solving skills	1			Helpful colleagues	1
	Technological knowledge competences	1			Inter-professional collaboration	1
	Value	**1**			Interactions and Support	1
	Employer-employee value alignment	1			Knowledge Sharing and knowledge retention	1
					Machine-human interaction	1
Job Characteristics - Allocation of work	**Job/ Task design**	**4**			Networks	1
	High skilled occupation	1			Open and trusting communication	1
	Job position	1			Open communication	2
	Self-employment	1			Presence of experienced colleagues/teachers	1
	Type of job: Hard/soft - skilled job	1			Shared language	1
					Structured dialogic interactions	1
	Amount of change	**2**			**Safety**	**1**
	Balancing newness	1			Psychological safety	1
	Changing demands of the Job	1			Social setting	7
Job Characteristics - Structuring of work	**Job autonomy**	**11**			Possibilities for social interaction	1
	Autonomy support	1			Sense of family	1
	Career control	1			Social support	1
	Flexible work roles	1			Social support from colleagues	1
	Job autonomy	4			Workplace friendship	1
	Job control	3			Workplace fun: Co-workers socializing	1
	Task autonomy	1			Workplace fun: fun activities	1
	Job demands	**7**				
	Expected successful performance	1		**Organization Characteristics**	**Sector**	**2**
	Job demands	2			Job sector	1
	Job expectations	1			Type of sector	1
	New task challenges	1			**Size**	**1**

Micro	N	Meso	N		Macro	N
Task complexity	1				Firm size	1
Workload	1				**Structure**	**4**
Job/ Task design	**10**				Financial support	1
Job demands + Social support	1				Good quality training	1
Job transition	1				Simple organic structures	1
Skills mismatch	1				Training opportunities	1
Skills use at work	1				**Broader context**	**8**
Task and goal interdependence	1				Culture	1
Task variety	3				Cultural capital	1
Temporary contract	1				Employment system	1
Weekly working hours	1				Employment system type	1
Stability and security	**6**				Geographical factors	1
Income	1				Geographical factors	1
Job Security	5				Industry	1
Time	**1**				Sector-based factors	1
Deadline time pressure	1					

Table A2

Overview of Barriers in Micro, Meso and Macro Levels within the Categories

	Micro	N		Meso	N		Macro	N
					1			**19**
Sociodemographic Characteristic	**Demographics**	8	**Learning Activity/Tool**	**Engaging in activity**	1	**Workplace Climate**	**Company Orientation**	1
	Age	7		Lack of access to computer and internet	1		Institutional barriers	1
	Nationality	1					**HRM Practices**	1
	Job details	3					Wrong HR evaluation of staff	1
	Tenure	2					**Leadership**	1
	Work experience	1					Lack of time for supervision	1
							Learning climate	8
Individual Attributes	**Attitudes/ Orientation**	3					Absence of guidance	1
	Failure to comprehend implied expectations	1					Inappropriate, inadequate and poor-quality training	1
	Lack of value for learning	1					Lack of accessibility	1
	Lacking workplace goals	1					Lack of guidance	1
	Personal traits	1					Limited engagement with formal training	1
	Resistance to change	1					Limited mindset	1
	Skills/ Competence	1					Reliance on self-regulation	1
	Knowledge gaps	1					Restrictive learning environments	1
							Organizational Change	2
	Amount of change	1					High transient workplace	2
	Increasing speed of change	1					**Possibilities for knowledge sharing and retention**	6
	Job demands	2					Absence of sharing culture	1
	Apprentice with too much responsibility	1					Disrupting others work	1
	Job takes place 24/7	1					Human-human interaction	1
Job Characteristics	**Job/ Task design**	1					Lack of availability of senior employees	1
	Education-job fit	1					Language diversity	1
	Stability and security	5					Limited collaboration between workplace and vocational institution	1
	Qualitative job insecurity	4						
	Transient work relations	1				**Organization Characteristics**	**Structure**	3
	Time	5					Generic information	1
	Lack of time	2					Lack of progression opportunities	1
	Time constraints	2					Shortage of staff	1

Lack of time for guidance	1