Master Thesis Strategic Human Resources Leadership

Self-regulated learning of skills for blue-collar workers

Facilitating self-regulated learning in the blue-collar industry

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Preface

I am grateful for sharing my thesis on '*Self-regulated learning of skills for blue-collar workers: Facilitating self-regulated learning in the blue-collar industry'*, which I completed as part of my Master Degree in Business Administration with a specialisation in Strategic Human Resources Leadership. Writing this thesis challenged me to explore a very interesting research topic, and I feel proud to be able to add new insights to the existing body of work. I hope that with this research I can provide a meaningful addition to the research topic.

First of all, I would like to thank everyone who made a contribution to the making of this thesis and who supported me throughout the research process. I would like to thank my supervisor, Dr. Jeroen de Jong, for his support and for providing me with feedback that gave me new insights that allowed me to take my research to the next level. Your willingness to answer my questions at any time and your enthusiasm as a supervisor guided me through this process and ultimately helped me to finish this thesis. Moreover, I would like to thank Dr. Sofija Pajic for providing valuable feedback and insights on my thesis as the second examiner.

Additionally, I would like to thank my parents, my friends, and my fellow graduate students for their support during the research process and writing my thesis. They gave me the inspiration and encouragement to successfully complete my research project. Finally, I would like to thank the interview participants for their openness in sharing their experiences, as well as the organisations that made it possible to gather the information to write my thesis.

I hope you will enjoy reading my thesis!

Esmee Hermsen

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Abstract

The incorporation of technology in today's workplace necessitates a shift in the skill set of blue-collar workers. However, little attention has been paid to the scientific literature about how self-regulated learning is facilitated for blue-collar workers. Therefore, this research gained insights into how organisations within the blue-collar industry facilitate self-regulated learning of skills. To investigate this research topic, a qualitative multiple-case study was conducted within three cases, consisting of ten interviews and three documents derived from the organisations. Five themes emerged from the collected data, and accordingly, a theoretical framework was developed that showed the relations between the different concepts. The analysis demonstrated that learner autonomy, as well as evaluating learning performance and feedback, are the most important self-regulated learning practices for blue-collar workers in relation to skill acquisition. In addition, the facilitation of self-regulated learning can be influenced by the organisational culture and structure. Therefore, the results of this study can contribute to the existing body of literature about how organisations within the blue-collar industry facilitate self-regulated learning of skills for their blue-collar workers.

Key words: skill acquisition, self-regulated learning, facilitating self-regulated learning, learner autonomy, organisational culture and structure

Context

1. Introduction 4
2. Theoretical background 7
   2.1. Skills 7
   2.2. Self-regulated learning 7
   2.3. Process of self-regulated learning 9
   2.4. Facilitating self-regulated learning in organisations 11
3. Methodology 13
   3.1. Research design 13
   3.2. Data collection 14
   3.3. Sample 15
   3.4. Data analysis 16
   3.5. Quality criteria 17
   3.6. Research ethics 17
4. Results 19
   4.1. Embracing technology-driven change 19
   4.2. Essential skills blue-collar industry 20
   4.3. Upskilling through self-regulation 21
   4.4. Facilitating self-regulated learning 24
   4.5. Role of organisational factors in facilitating self-regulated learning 26
5. Discussion 29
   5.1. Conclusion 29
   5.2. Theoretical contributions 30
   5.3. Practical implications 32
   5.4. Limitations and directions for future research 33
   5.5. Final conclusion 34
6. Reference list 35
Appendices 42
   Appendix A: Interview guide 42
   Appendix B: Operationalization 43
   Appendix C: Interview topic lists 45
   Appendix D: Coding data structure 55
   Appendix E: Reflection research process 57

1. Introduction

In today's fast-changing work environments, due to technological innovation, skills rapidly become outdated, which means that workers of the 21st century need to continuously develop their competencies to deal with smart technologies, such as artificial intelligence, digitalization, or robotization (Fraccaroli et al., 2024; Winkelhaus & Grosse, 2020). These smart technologies can take over repetitious or labour-intensive tasks, allowing workers to engage in more advanced and automated work (Roblek et al., 2016). This may be especially true for those working in the blue-collar industry –so-called blue-collar workers, who mainly perform manual labour in production or manufacturing. Additionally, these smart technologies require blue-collar workers to expand their range of skills as they are supposed to take on new tasks, e.g., how to work with a robot.

As the sustainability of skills generally decreases due to the rapid development of technologies, blue-collar workers are expected to adapt their skill set to the demands of the current workforce through self-regulated learning (Endedijk & Cuyvers, 2022). Self-regulated learning can be seen as a fusion of *skill* and *will* in which the learner has to plan, control, and evaluate their cognitive, behavioural, motivational, or contextual processes (McCombs & Marzano, 1990). The learner is self-motivated, knows their possibilities and limitations, and can optimise their performance and skills through practice. Furthermore, self-regulated learning enables blue-collar workers to develop skills as well as obtain knowledge to find the best solutions for challenges facing them in the current workforce while also succeeding in their learning process (Albelbisi & Yusop, 2019).

Studies on self-regulated learning are often conducted within a certain professional field, as every profession brings unique characteristics and therefore a different context, thus highlighting the importance of studying self-regulated learning across different professional domains (Endedijk & Cuyvers, 2022). For instance, someone who works at home and communicates with their colleagues once a day might deal with different learning constraints than a nurse. Moreover, several studies have already focused on self-regulated learning in the context of finance or nursing professionals; however, it has been emphasised that it is necessary for future research to investigate other workplace contexts as well (e.g., Kurt & Eskimez, 2022; Littlejohn et al., 2016). Besides, as a few studies so far have focused on informal workplace learning in the blue-collar industry or informal learning in combination with self-regulated learning in the workplace, blue-collar workers are still an under-researched target group regarding learning and development (e.g., Decius et al., 2021; Kittel & Seufert, 2023).

Although numerous approaches exist to carry out learning, suitable learning opportunities within a fast-changing workforce due to technological innovation are scarce (Ras et al., 2017). Without adequate training or education, it may heighten the risk that blue-collar workers are excluded from the current work environment. Hence, it is important to further investigate how self-regulated learning can be translated into the blue-collar industry.

Moreover, within prior research, the importance of the work environment has already been emphasised in terms of skill creation as it can 'afford' opportunities, such as increasing the amount of variety of the work, in ways that support the learning process (Vaughan, 2008). Therefore, the organisation needs to consider how to shape the facilitation of self-regulated learning, which means that managers and HR should offer opportunities and conditions beneficial for learning (Kyndt & Baert, 2013). The workplace as a learning environment should, for example, include the following learning conditions: a guiding manager and learning resources (Tan, 2023). Also, conditions such as a high degree of exposure to demands and rewarding proficiency are necessary to enhance learning in the workplace (Skule, 2004). However, there is still no framework that considers the specific learning conditions of blue-collar workers, even when it has been found that when facilitated, through managers, or supported by established processes, they can develop their skills (e.g., Decius et al., 2021). Additionally, there is a continued lack of understanding of the impact of the work environment on individuals' self-regulatory practices (Margaryan et al., 2013). For that reason, it is important to understand how organisations facilitate self-regulated learning of skills for blue-collar workers. This leads to the following research question:

How do organisations in the blue-collar industry facilitate self-regulated learning of skills for blue-collar workers?

The overarching aim of this study is to contribute to the existing literature in the field of self-regulated learning by gaining insight into how organisations within the blue-collar industry facilitate self-regulated learning of skills for blue-collar workers. To acquire the data needed to answer the research question, this study will employ interviews and document analysis as part of a multiple-case study. Within this multiple-case study, three cases will be analysed in which a case can be defined as an organisation. Furthermore, this study adds to the body of knowledge of self-regulated learning as it will provide empirical insights into how self-regulated learning can be translated into the blue-collar industry, as previous studies already explored self-regulated learning within other workplace contexts (e.g., Kurt & Eskimez, 2022; Littlejohn et al., 2016).

Besides, as the existing literature depicts that the current workforce requires an adapted skill set for blue-collar workers, this research will demonstrate how an organisation facilitates self-regulated learning practices that can lead to the acquisition of skills (e.g., Endedijk & Cuyvers, 2022; Kyndt & Baert, 2013). Additionally, a theoretical framework will be utilised that considers the needs of blue-collar workers during their learning process, as it offers insights into the practical application of self-regulated learning practices in the context of the blue-collar industry. Moreover, this study may have practical implications for researchers, organisational management, and policymakers since the findings will be valuable for knowledge exchange and adapting to the needs of the changing workforce.

The structure of this thesis is as follows: First, the theoretical background will define the key concepts of this research. Next, the methodology will outline the research design, including the data collection and analysis. Lastly, the results are presented and discussed before drawing conclusions, providing limitations as well as recommendations for future research.

2. Theoretical background

Within this chapter, an extensive literature review is provided in which the concept of skills will be addressed, followed by the concept of self-regulated learning and the process of self-regulated learning. Lastly, facilitating self-regulated learning within organisations is outlined.

2.1. Skills

Within the existing body of research, a skill can be defined as "an individual's ability to accomplish tasks by utilising appropriate resources, including those acquired through training or previous experience" (Le Boterf, 2000, p. 161). This definition provides an understanding of the underlying competencies to successfully finish a task. Moreover, a differentiation can be made between hard and soft skills. Hard skills are technical, tangible, and quantifiable abilities related to the use of equipment for a specific job, such as driving a car, acquired through training and education; however, soft skills are personal, intrapersonal, and interpersonal qualities, such as emotional intelligence and communication (Dell'Aquila et al., 2017; Lyu & Liu, 2021). Unlike hard skills, obtaining soft skills requires dedication, self-improvement, and self-reflection, although it is important to possess both types of skills to be a successful worker (Chell & Athayde, 2017). Additionally, the success of a skill is dependent on the direct content of the task, abilities, and environment of the individual as they enable workers to develop specific tasks within various settings (e.g., Le Boterf, 2000).

Research on skill acquisition showed that skills fundamental for blue-collar workers to do their jobs are related to know-how but also to traits or characteristics developed through training, practice, or experience (Adeyemo, 2010). Yet, a formal education is not required, as for the most part, they acquire skills through experience; however, technical training is obligatory (Mittal et al., 2019). Nevertheless, the skills required to succeed within the blue-collar industry have changed as tasks are becoming less repetitious due to technological innovation, which demands continuous skill development (Ras et al., 2017). Hence, self-regulated learning is essential for blue-collar workers to remain employable, as it enables them to acquire skills to continuously optimise their tasks and deal with changing skill requirements.

2.2. Self-regulated learning

Over the years, the concept of self-regulated learning has been defined and redefined by various researchers. Pintrich (2000) defined self-regulated learning as "a constructive process whereby learners set goals for their learning and attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided by their goals and contextual features of the environment" (p. 453). However, self-regulated learning also includes the ability to control a learning process

in which learners take the initiative to formulate learning goals and monitor their understanding of the learning process to eliminate possible problems (e.g., Zimmerman, 2002). Furthermore, learners who define their goals, monitor the process, and adapt them accordingly to the received feedback "master learning contents faster and keep their motivation to learn more often" (Zimmerman, 2013, p. 2). These definitions share three components: *cognition*, *metacognition*, and *motivation*, which are interrelated as an unmotivated individual with cognitive skills will not achieve the same level of performance as an individual who possesses skills and is motivated to use them (Zimmerman, 2000). Similarly, if an individual is motivated but does not possess cognitive or meta-cognitive skills, they often fail to achieve self-regulation.

The first component, cognition, consists of *encoding, organisation, elaboration, and inferencing* (Schraw et al., 2006). Encoding is the ability to process information in the long-term memory, as the working memory is limited. Second, organisation refers to how information is stored in the long-term memory. Third is elaboration, where new information is linked to information in the long-term memory. However, there are two types of elaboration: shallow elaboration and elaborative rehearsal. Shallow elaboration is called maintenance rehearsal, where information is repeated and, within elaborative rehearsal, mental images on a deeper level are created. Lastly, inferencing is the ability to infer new information based on existing information (Schraw et al., 2006). In sum, referring back to self-regulated learning, cognition includes low-level information processing, such as reading and repeating information, as well as higher-level information processing, like organising the processed information (Bannert et al., 2014). Still, it depends on the case what can be a beneficial activity; reading can be beneficial to gain knowledge, but repeating might be unproductive.

The second component, meta-cognition, has two subcomponents: *knowledge of cognition* and *regulation of cognition* (Schraw & Moshman, 1995). Knowledge of cognition has three forms: declarative, procedural, and conditional knowledge. Declarative knowledge is knowledge of factors that can influence performance. Procedural knowledge refers to knowledge about strategies and conditional knowledge about when to use a certain strategy. Moreover, the regulation of cognition has three components: planning, monitoring, and evaluation. Planning is focused on allocating resources concerning goal-setting, monitoring on self-testing skills to control learning, and evaluation concerns the assessment of goals (Schraw & Moshman, 1995). Overall, meta-cognition involves higher-order processes, such as an individual being encouraged to consider the domain-specificity of self-regulated learning; how they approach one task might not be the best way to approach another (Goetz et al., 2013).

Finally, the third and last component of self-regulated learning is motivation (Schraw et al., 2006). This component refers to the individual's belief in their capacity to learn, which consists of four subcomponents: *self-efficacy, attributions, goal orientation,* and *intrinsic motivation*. Self-efficacy is the degree to which an individual has the confidence to perform a specific task or accomplish a goal, which is important for self-regulated learning since it affects the extent to which a learner engages with challenging tasks. The second subcomponent is attributions, referring to causal explanations of events. Third are goal orientations, which are beliefs about ability. Lastly, intrinsic motivation is when a task is performed for inherent satisfaction. Conversely, a task performed for external reasons may lead to displeasure and, therefore, decrease the desire to perform it again (Schraw et al., 2006).

2.3. Process of self-regulated learning

The comprehensive model of Zimmerman (2002) describes the process of self-regulated learning from a social-cognitive perspective, which suggests that it is a cyclical process in which a self-regulated individual plans a task, monitors their performance, and reflects on the outcome. The social-cognitive perspective supports the view that self-regulation is influenced by internal and external factors of the learner, such as self-administrated rewards (Thomas, 2013). Moreover, the cycle repeats itself after the individual has reflected on the outcome and adapted changes, which can be different for each individual's learning task. The model in Figure 1 (Zimmerman, 2002, p. 67) shows that self-regulated learning consists of three phases: *forethought, performance,* and *self-reflection*. Each phase is a composition of interoperations between cognition and metacognition, which means that within the different phases, processes for metacognitive, motivational, and cognitive elements are related to the learning purpose of the self-regulated individual (e.g., Tran & Hasegawa, 2022). For example, cognition and metacognition can be related to the performance phase and motivation to the forethought phase.

The first phase, the forethought phase, refers to processes and beliefs that occur before the individual makes efforts to learn in terms of establishing a plan or setting goals (Zimmerman, 2002). In this phase, there are two major classes: *task analysis* and *self-motivation beliefs*. Task analysis consists of practices such as goal setting and strategic planning, and self-motivation beliefs consist of self-efficiency, outcome of expectations, intrinsic interest, and learning goal orientation. Furthermore, self-efficiency is related to individuals who can learn and achieve their goals. Intrinsic interest is about valuing task skills, and learning goal orientation is about valuing the process (Zimmerman, 2002).

Figure 1
Process of self-regulated learning

Note. From "Becoming a Self-Regulated Learner: An Overview," by B. J. Zimmerman, 2002, *Theory Into Practice*, *41*(2), p. 67 (https://doi.org/10.1207/s15430421tip4102_2). CC BY-NC.

Second is the phase of performance, consisting of *self-control* and *self-observation*, which happen to be the processes that occur during the implementation of the action plan in the forethought phase (Vassou, 2017; Zimmerman, 2002). Self-control is related to the process through which individuals use cognitive strategies, such as self-instruction, imagery, attention-focusing, and task strategies. On the other hand, there is self-observation, which is related to designing metacognitive strategies to evaluate learning performances, including metacognitive monitoring and self-recording (Lourenco & Ferreira, 2019).

Third is the self-reflection phase, which consists of *self-judgement* and *self-reaction* that occur after the individual's learning effort, where applied strategies will be evaluated and the planning will be adapted for the next task (Vassou, 2017). Self-evaluation is one form of self-judgement in which the self-observed performance is compared with a standard performance (Zimmerman, 2002). Another form is causal attribution, which is about the cause of errors or successes in motivation. In terms of self-reaction, there is self-satisfaction and adaptive or defensive reactions. Self-satisfaction can enhance motivation regarding the learners' performance. However, self-reaction can become defensive when someone is protecting their self-image by avoiding opportunities to gain experience. Conversely, an adaptive reaction can increase the effectiveness of the learning method. In the end, self-reflection influences the next task due to its cyclical nature (Lourenco & Ferreira, 2019).

Altogether, the strength of this model is its ability to examine underlying strategies and variables extracted from it: *planning* and *self-efficiency* (forethought phase), *self-monitoring* and *effort* (performance phase), and *self-evaluation* and *reflection* (self-reflective phase) (Lourenco & Ferreira, 2019). Furthermore, the process of self-regulated learning is linked to certain domains, and individuals learn how to apply self-regulated learning practices in that specific domain (Zeidner, 2019). However, it is unknown whether these practices are also applicable to blue-collar workers, as individual learners need to be taught different self-regulatory practices in different settings. This makes it important to understand how these self-regulated learning practices will fit in the blue-collar industry. Besides, as mentioned before, the interrelated components of self-regulated learning are integrated into the different phases as they are related to the learning purpose of the self-regulated individual (e.g., Tran & Hasegawa, 2022). These components also need to be considered when creating tailored self-regulated learning practices. Therefore, the following sub-research question:

What are self-regulated learning practices for blue-collar workers?

2.4. Facilitating self-regulated learning in organisations

Several researchers argued that an organisation needs to create a learning environment that can facilitate self-regulated learning in which they provide systems and procedures for the workers' development process (Lancaster & Di Milia, 2015). From a theoretical perspective, a learning environment is defined as "the conditions and practices in an organisation that are likely to facilitate or hinder learning in and through work at a particular workplace" (Ellström et al., 2008, p. 7). Hence, the learning environment needs to include a range of components and activities in which learning can occur, such as structures, technology, social support, and policies (Lancaster & Di Milia, 2015). As a result, a supportive learning environment generates employees who think proactively, are open to new ideas, and seek to develop innovative solutions for future problems (Camps & Rodríguez, 2011).

Furthermore, managers also have a significant influence in relation to the learning environment as they provide blue-collar workers with encouragement and support in developing new initiatives (Mohammed & Ali, 2016). Especially in an environment that is not typical for extensive learning activities, as within the blue-collar industry, a mix of personal learning and social support is important; therefore, managers have to be available for feedback, giving blue-collar workers the feeling that learning in relation to skill acquisition is desirable (e.g., Decius et al., 2021). Moreover, blue-collar workers either learn while working or when

they are driven by motivation. Hence, the internal desire to acquire skills could counterbalance the effect of the environment, which may be poorly for stimulating learning.

Therefore, within the learning environment, learning conditions need to be implemented to enhance the learning process but also to provide guidelines on how learning can be stimulated (Skule, 2004). Clauwaert and Van Bree (2008) define learning conditions as "conditions created in the social, material, or informational environment and in the work environment itself by key figures and agents of the labour organisation and by the employees themselves so that other employees can learn" (p. 40). In line with the learning environment, Skule (2004) defined seven learning conditions that can enhance learning at work: 1) a high degree of exposure to change; 2) a high degree of exposure to demands; 3) managerial responsibilities; 4) extensive professional contacts; 5) superior feedback; 6) management support for learning; and 7) rewarding of proficiency. Besides, Tan (2023) identified five additional learning conditions:

1) **Guiding manager**: the manager can play the role of a mentor or coach to contribute to the learning experience in the form of giving feedback and support;
2) **Opportunities and challenging projects**: there needs to be access to opportunities or challenges to strengthen the learners' capabilities to be motivated to learn a new skill;
3) **Learning resources**: for the learner, it is important to have access to learning resources, such as experts, and schedule flexibility to pursue their learning opportunities;
4) **Organisation processes and culture**: certain practices are necessary in the organisation to facilitate learning, such as individual development planning processes or an open culture in which the learners are encouraged;
5) **Learning in a team**: if the organisation can facilitate a diverse team, it has a positive effect on exchanging information and giving each other feedback.

Although the learning conditions are applicable in various work contexts, it is unknown within the current body of work whether these conditions are also relevant to the blue-collar industry (e.g., Skule, 2004; Tan, 2023). However, according to Hillberg Jarl (2024), working and learning in the workplace are inextricably linked because, while working, blue-collar workers can gain experience and learn from it. As a learning environment in combination with organisational structures can facilitate personal development and maximise skills investments, it is therefore relevant to further investigate how an organisation can facilitate self-regulated learning within their current environment by answering the following sub-research question:

How can an organisation facilitate self-regulated learning?

3. Methodology

In this chapter, the methodology of the research is described, justifying the choices that have been made during the research as well as the data collection methods. Moreover, it describes the data analysis procedure, the research quality criteria and the ethics of this study.

3.1. Research design

To provide an answer to the research questions, a multiple-case study has been conducted. This approach can be applied when an in-depth investigation of a phenomenon within its real-life context is required, especially when the context appears relevant for the phenomenon; thus, self-regulated learning for blue-collar workers (the phenomenon) within the blue-collar industry (the context) has been investigated (Miles et al., 2014). Moreover, research argues that this research design is suited for how questions of an exploratory nature as human behaviour have been studied (e.g., Adams et al., 2007). Furthermore, it can facilitate the exploration of a phenomenon, as various data sources have been exploited to study the research topic through a variety of lenses to reveal multiple facets of the phenomenon (Baxter & Jack, 2008). Besides, a multiple-case study design offered the possibility to compare patterns between cases, which provided information in the form of empirical evidence to add to the body of literature on self-regulated learning as similar patterns have been found (Schell, 1992).

Additionally, given the aim of this research, qualitative research has been conducted to understand what lies behind the phenomenon, which is suitable because participants' experiences and perceptions had to be obtained to answer the 'how' question instead of describing how much (Cypress, 2015; Tenny et al., 2022). It explains certain processes of human behaviour that are difficult to quantify, such as self-regulated learning for blue-collar workers, which asks for feelings and experiences. Lastly, qualitative research provides information regarding the context of the phenomenon, which makes it able to translate self-regulated learning within the blue-collar industry (Bleijenbergh, 2013). Moreover, three cases within the blue-collar industry have been examined, as the possibilities of contributing to existing theory will increase when multiple cases are studied. This also concerns the phenomenon, as it offers the possibility to compare cases with each other for better insights into the patterns that are associated with that particular phenomenon. Besides, three to four distinct cases for comparison are the most cases that one can handle (Schoch, 2020).

Furthermore, in a multiple-case study, a single case is also of interest since it belongs to a collection of cases with common characteristics; therefore, all organisations are established in the blue-collar industry (Stake, 2006). However, there are variations in the types of

organisations, as case A specialises in production, case B in logistics, and case C performs both production and logistical tasks. Additionally, three different stages of technological adoption are relevant to the context of the research, as it has been investigated what influence the integration of technology has on the blue-collar industry. First is the pre-adoption stage, where organisations recognise the need for technological advancement and try to collect information about its existence (Himang et al., 2020). Second is the adoption stage, when an organisation manifests acceptance of the technology and allocates it as a future resource. Finally, the post-adoption stage after everything is implemented and there is sustained use of the innovations.

3.2. Data collection

Interviews and document analysis have been conducted to gather empirical evidence regarding the research topic. First of all, the qualitative, in-depth interviews provided a broader understanding of how and why certain things happened but also measured the opinions and feelings of the participants, as well as their non-verbal communication (e.g., Jain, 2021). Besides, this made it possible to uncover the participants' perceptions and derive meaning from their statements, which is reflected in the findings of this research (Braun & Clarke, 2013). Furthermore, as little is known about the phenomenon, qualitative interviews have been helpful to explore sensitive topics as participants may not always want to talk (Gill et al., 2008).

Before conducting the interviews, the purpose of this research was explained to the participants using an interview guide, and consent had been asked to record and transcribe the interviews (see Appendix A). Furthermore, the interviews followed a semi-structured interview format, which is suited for collecting empirical evidence by asking a standard set of open-ended questions as well as follow-up questions (Young et al., 2018). Additionally, a semi-structured interview format supports a dialogue between the interviewer and the interviewee as it allowed to change the order of the questions during the interview (Naz et al., 2022). Moreover, the interview questions were created based on an operationalization of the theoretical background (see Appendix B), which developed a topic list with pre-determined questions to compare the answers based on the transcripts (St. John et al., 2014). Although the managers and HR had to answer a couple different questions about how they facilitate self-regulated learning for blue-collar workers, the topics stayed the same for all target groups (see Appendix C).

The second form of data collection within this multiple-case study is document analysis. The documents that have been analysed have substantive relevance, as they say something about how the organisation facilitates learning for their blue-collar workers, such as training and development policies (Bleijenbergh, 2013). Moreover, the documents verified the findings

from the interviews, which led to further investigation if there were contradictory results (Bowen, 2009). Within this study, three documents have been accessed, as the organisation in case A was not able to provide documents concerning the research topic; see Table 1.

Table 1
Overview documents

	Case	Type of document
1	B	Employee condition regulations
2	C	Training and education policy
3	C	Employee handbook

Note. Overview documents per case. Own work.

Moreover, triangulation has been applied, as different data collection methods were combined which provides a rich description of the various sources to enhances the credibility of the research (Smith, 2018). Additionally, a combination of primary and secondary data has been collected as the interviews were conducted for this study as primary data, whereas the theoretical background with existing literature from previous studies, and the documents that have been developed by the organisations are secondary data.

3.3. Sample

Before conducting the interviews, efforts have been made to approach organisations if they are willing to participate in this study. Besides, emphasising the fact that they can gain benefits from this research as it provides them with insights into how blue-collar workers would like the organisation to facilitate self-regulated learning. To identify information-rich cases when working with limited resources, *purposeful sampling* has been applied, as the organisation selected individuals knowledgeable about the phenomenon of interest based on certain inclusion criteria (e.g., Patton, 2002). More specifically, *homogeneity-purposeful sampling* has been exploited as a subgroup with the same characteristics; workers in the blue-collar industry have been studied. Additionally, it was essential to interview a manager and someone from HR within the same organisation to provide insights into how self-regulated learning is facilitated for blue-collar workers. Hence, ten participants were interviewed, see Table 2, which is an sufficient sample size and still feasible within the time constraints. Although a large sample size might give a better representation of the population, the increase in terms of accuracy appeared to be small, at which point "saturation" was reached (Andrade, 2021).

Table 2
Overview participants

Participant	Case	Position	HR, manager or blue-collar worker
1	A	Team leader production	Manager
2	A	HR manager	HR
3	A	Shift leader production	Blue-collar worker
4	A	Production worker kitchen	Blue-collar worker
5	B	Team leader logistics	Manager
6	B	Warehouse employee	Blue-collar worker
7	C	HR manager	HR
8	C	Warehouse coordinator	Manager
9	C	Technical service production	Blue-collar worker
10	C	Supervisor warehouse	Blue-collar worker

Note. Overview participants per case. Own work.

3.4. Data analysis

To address the research question, the collected data has been analysed to gain an understanding of the material, enhance judgement and draw appropriate conclusions (Sreejesh et al., 2014). After permission had been granted, the interviews were recorded and manually transcribed. Furthermore, to derive statements from the collected data and to contribute to the findings, the coding process followed three phases: (1) open, (2) axial, and (3) selective. A coding format created via Excel enabled consistent analysis of all transcripts and documents to avoid inconsistencies. For instance, to the sentence "*I think digitally, because you do not walk around with a book and paper all day*" (participant 4), the open code 'information dissemination' was attached since open codes are concrete concepts that describe a phenomenon that is labelled with a characteristic of the fragment or document (Bleijenbergh, 2013).

In the next phase, axial coding, connections were made between the open codes and distinguished themes (Bleijenbergh, 2013). As participant 4 mentioned something about the way information has been provided in the learning process, the open code 'information dissemination' became the axial code 'learning process', which has a higher level of abstraction as the number of derived codes is reduced. Finally, the phase of selective coding, in which fragments with the same overarching theme have been compared to derive patterns regarding the phenomenon, and the selective codes correlate the empirical data with the theoretical

background (Bleijenbergh, 2013). Hence, a relationship has been found between the concepts related to the learning process, creating the selective code 'Facilitating self-regulated learning'.

Moreover, the codes derived from the interviews and the documents were identified for similarities and differences per case to support or refute the findings on an overarching level. Given the findings, the data was coded twice to reach a higher level of analysis, focusing on the concepts rather than only describing the results of the research. Thus, a coding data structure has been developed that provides an overview of how the data analysis proceeds from open codes to axial codes and ultimately to selective themes (see Appendix D). This iterative process ensured that stronger connections between cases could be defined, which led to more sustained answers, using participant quotations to illustrate the individual experiences.

3.5. Quality criteria

Different research criteria can examine the quality of qualitative research: *credibility, transferability, dependability,* and *confirmability* (Guba & Lincoln, 1989). Credibility means trying to find a good fit between the constructed realities of the participants and their reconstructions; for this reason, peer debriefing and member checking have been applied. Peer debriefing means discussing ongoing research practices with colleagues to encourage reflexivity; this has been part of the Thesis Circle in which the supervisor and other students reflected on this report. Member checking entails that the interpretations of the data will be tested with the participants for accuracy; hence, after the interviews, the participants were asked if they would like to read the transcript, but no participant wanted this (Guba & Lincoln, 1989).

The second criterion, transferability, can be examined by providing enough detail about the specific research case so that the reader can judge what other contexts might also be informed by the findings; therefore, a detailed description of the research case is provided (Guba & Lincoln, 1989). Third is the criterion of dependability, which demonstrates methodological changes within the research process as a detailed description of the research process has been provided for the reader to understand the reasoning behind certain decisions. Lastly, there is the criterion of confirmability, in which it should be clear where the data originally came from and how the data is transformed into findings; thus, a detailed description of the data analysis process is provided (Guba & Lincoln, 1989).

3.6. Research ethics

It is also important to consider the ethical aspects of the research process. For example, the participants have been given their permission to record and transcribe the interview, which can be withdrawn at any moment (Qu & Dumay, 2011). Furthermore, during the research process,

the collected data has been anonymized to ensure the privacy of the participants. Additionally, this study will be reviewed by a supervisor and a second examiner to prevent ethical issues that might have been unseen by the researcher. Moreover, a research integrity form has been signed by both the researcher and the supervisor that acknowledges that the researcher is responsible for their work, takes care of participant confidentiality, and provides participants with adequate information. Besides, throughout this study, the guidelines of the American Psychological Association (APA 7) have been applied to follow the ethical standards. Finally, a reflection on the research process have been enclosed (see Appendix E).

4. Results

This chapter presents the findings of the research in five overarching themes related to the research questions. Additionally, Table 3 provides an overview of the cases in which information has been presented regarding the context of technological innovation.

4.1. Embracing technology-driven change

All organisations were found to have developed in the integration of technology in the work process. The use of technology allows blue-collar workers to process larger quantities within a shorter amount of time as technologies control multiple stages of the work process. However, in case A, only a part of the production process is self-operating, as numerous tasks are still carried out manually. Participants in case A confirm that, even when the robot performs the majority of labour-intensive tasks, preparing a production line is still completed by hand. Hence, the organisation would be classified in the adoption stage of Himang et al. (2020) because they manifest the acceptance of technology, giving them the label *medium* since the work process is to a certain extent automated. Conversely, in case B, the machine performs a substantial part of the work process, allowing the organisation to focus on process optimisation. Therefore, the organisation would be allocated in the post-adoption stage of Himang et al. (2020), as there is a sustained use of technologies and a *high* extent of automated work activities. Similarly, in case C, the organisation invested in technologies that significantly automated their work process, enabling the robot to perform additional tasks. As they already integrated several technologies, the post-adoption stage would be fitting due to the *high* amount of automated work activities (Himang et al., 2020).

Even though the integration of technology in the work process has been embraced by all organisations, there are several implications. Participants from all organisations highlighted that the current work process requires a different way of working because blue-collar workers had to learn how to manage a robot or machine. Besides, as certain work activities are no longer performed as they are carried out by technologies, the majority of participants acknowledged that the profession of blue-collar worker has changed. Participant 9 stated: *"Look, the position has changed somewhat; for example, you no longer have to perform certain tasks"*. Nevertheless, as managing the robot is generally done from behind a computer, participants revealed that the work of a blue-collar worker has become easier as the physical element of the work has decreased; maybe even more once all issues with the technologies are removed.

Responses to a question on the integration of technology confirmed that eight out of ten participants agreed that technology makes their job easier. However, the HR manager in case

A emphasised that technology can also add to the complexity of the work process. *"People who used to work in the kitchen are people who have actually learned a trick. But now they need to know more about the technology itself"* (participant 2). Within case A, it can therefore be argued that the role of technology increased the complexity of performing certain work activities. To illustrate, technologies allowed the development of various types of products due to shorter conversion times, yet the amount of supplies essential for the machine to function has to be measured manually. Hence, both cases B and C have been assigned the label *less* as the use of technology did not add complexity to their work activities; however, due to distinct opinions in case A, both labels *more* and *less* may be fitting. Overall, participants claimed that the integration of technology has not affected the job requirements of a blue-collar worker.

Table 3
Overview cases technological innovation

	Case A	Case B	Case C
Stage of technology adoption	Adoption	Post-adoption	Post-adoption
Type of technology	Robot (Tante Net)	Machine (EVO)	Robot & machines
Extent of work automated	Medium	High	High
Added complexity of working with technologies	More & Less	Less	Less

Note. Overview participants per case. Own work.

4.2. Essential skills blue-collar industry

In all three cases, the knowledge, characteristics, and skills to perform as a blue-collar worker are very similar, as participants stated that there are few job requirements because the work is not very difficult to complete. Knowledge-wise, having a basic understanding of technology is the most important qualification. For instance, in case A, a blue-collar worker has to be able to set up a production line, but they are not required to know how a robot needs to be programmed as that task is performed by others. Similarly, in case C, the technical support service aims to simplify the work activities for blue-collar workers; thus, *"as a result, they do not actually need a lot of knowledge"* (participant 9). This statement supports that there are few knowledge requirements, as certain work activities that require knowledge are performed by others.

Aside from knowledge, blue-collar workers require several skills to perform work activities, such as packing goods in boxes or transporting supplies to the designated location.

In case B, there are different departments in which blue-collar workers have to carry out a variety of tasks, which also requires various types of skills. Although it appears that none of the participants can precisely describe what skills are essential for a blue-collar worker. Hence, in case A, the manager claimed that the skills required to carry out the work activities could be trained. *"I think everything we do in here can be learned by anyone with reasonable common sense. I think this is actually the case with most production companies"* (participant 1).

Interestingly, there are, however, differences in terms of the required level of education, as in case A, an intermediate vocational educational level of four is considered necessary for a blue-collar worker, whereas in both cases B and C, an level of one or two is already sufficient. This relates to the fact that, at least according to the HR manager of case C, the organisation values experience and status more than a certificate:

> Yes, there are educational requirements in their job profile. However, most of the people who work here have been working here since the beginning. So, they have no training but a lot of experience . . . . And here they have a very high status; for them, experience is more important than a piece of paper (participant 7).

Furthermore, the majority of participants in both cases A and C claimed that a blue-collar worker needs to be proactive, people-oriented, and stress-resistant. Above all that, in case B, they have to take initiative and need to be able to cooperate with their colleagues. Nonetheless, the ability to work together is an important factor in all cases. Additionally, in terms of learning in teams, in case A, learning often takes place in teams, whereas, according to the HR manager and the manager, this is not always possible as they have to temporarily shut down the entire production process. Similarly, in both cases B and C, learning is carried out individually for the same reason. Hence, it can be concluded that, despite distinct opinions, the organisation in case A provides opportunities for learning both individually and in teams, in contrast to cases B and C. For instance, in case B, blue-collar workers have to take care of their tasks within a specific work area, which determines the skills they have to obtain on an individual level.

4.3. Upskilling through self-regulation

How blue-collar workers can indicate that they have a desire for further personal development is the same within all cases; when they have the ambition, for example, to learn how to work with a new system, this can be indicated during their annual appraisal. Interestingly, there is only a minority of participants who no longer desire further development given their age or that they have already achieved their esteemed position within the organisation. However, all organisations enable blue-collar workers to follow training or education as they recognise the

value of further development. For instance, in case C, blue-collar workers can submit a request to participate in a training through their manager. Additionally, participants highlighted that the manager stimulates blue-collar workers to consider their opportunities to pursue more training and education. Yet, in case C, according to the HR manager, blue-collar workers frequently fail to recognise their own potential, as it is often implied that they are not good enough when they are being encouraged to learn.

Moreover, all organisations offer **development opportunities** for blue-collar workers, such as following an intermediate vocational education or the opportunity to obtain certificates if they ask for them because they are not being promoted. Within cases A and B, there are a lot of development opportunities as they offer a tailor-made learning process. Besides, in the training and development policy of case C (personal communication, May 15, 2024), the organisation prioritises the career paths of blue-collar workers in relation to vertical and horizontal career development, providing them with various opportunities to learn skills as well as trying to keep pace with technological advancements to keep their skills up-to-date.

Furthermore, in both cases A and B, a **personal development budget** has been made available to blue-collar workers who desire to advance their careers. For instance, the employee condition regulations of case B (personal communication, May 1, 2024) highlight the value of personal development, which can be accommodated in terms of time and money. In case C, there is no established personal development budget, which, as the organisation claims, can lead to unequal opportunities in terms of skill development, according to their training and development policy (personal communication, May 15, 2024). However, participants in case C confirm that this has not affected them, as everything is possible in terms of development opportunities. Overall, participants claimed that the organisation provides them with a high degree of **learner autonomy** when developing skills, as they have to take initiative in self-regulating their learning process.

Building on the self-regulated learning practices, in both cases A and B, learning goals are formulated by the manager and the blue-collar workers based on their learning needs, in reference to the forethought phase of Zimmerman's model (2002). In case A, the learning goals are linked to a training programme called TWI (training within industries), which focusses on learning step by step how to work with technology. Furthermore, in case C, the learning goals are linked to their assessment system as they are formulated if there is still room for improvement in their current salary scale. Nevertheless, the HR manager claimed that blue-collar workers receive a higher score than they deserve to avoid having a difficult conversation;

therefore, most blue-collar workers are already high in their salary scale, *"so it will make little sense to formulate learning goals"* (participant 7). Moreover, in case B, according to the majority of participants, blue-collar workers are assessed based on a competency-based system with no concrete learning goals; however, it is expected that they meet the competencies.

Besides, there are hardly any variations between the cases in terms of achieving learning goals, as, for instance, in both cases A and C, it is claimed that it is not that important how long it takes to learn something if the blue-collar workers show that they are invested in their learning process. Hence, the majority of participants confirmed that there are few requirements in terms of their learning goals, as *"you think together about how you can achieve the goal and, if that is not possible, what you can do to ensure that it succeeds. And sometimes it is not feasible, and we just talk about that"* (participant 10). It can therefore be argued that the learning goals are not an important factor in the learning process, as they are usually linked to an organisation-integrated training programme or system rather than to personal development opportunities. Also, there are no specific requirements regarding learning goals achievement.

Interestingly, **evaluating the learning performance** appears to be the most important factor in the learning process, as all participants agreed that during the annual appraisal, their overall learning performance as well as the learning goals were being discussed. Besides, the learning goals are connected to a bonus as an external motivator, wherein blue-collar workers are being rewarded based on their performance over the last year. Participants claimed that blue-collar workers are becoming more motivated to grow personally as they realise that performing well will result in a larger reward. *"Of course, they first have to perform in order to receive a good assessment and therefore a higher reward"* (participant 8). Moreover, evaluating the learning performance can be embedded in the performance phase of the process of self-regulated learning and enhance motivation regarding the learners performance in the self-reflection phase (e.g., Lourenco & Ferreira, 2019; Zimmerman, 2002).

In relation to the evaluation of the learning goals, **feedback** seems to be an important factor in the learning process of blue-collar workers. The majority of the participants argued that in recent years, the amount of feedback during the learning process has improved, although there still seems to be room for improvement as feedback can help them adjust their learning goals promptly. Additionally, in all cases, it can be argued that to successfully complete the learning process, a certain amount of support is expected from the organisation and their manager. Hence, in case B, this is supported from the side of the manager, as *"we also ask whether they need help from me or the organisation to achieve their learning goals"*

(participant 5). Furthermore, within case C, the managers are instructed to pay close attention to the blue-collar workers during their learning process and make adjustments if necessary.

4.4. Facilitating self-regulated learning

In each of the three cases, there are significant differences in how a learning process for blue-collar workers is designed. In case A, TWI is the benchmark for the planning of the learning process since it is tailored to the speed of the blue-collar worker. Conversely, in case B, the organisation works with mentors that determine how the learning process is structured based on their availability and the rate at which blue-collar workers learn new skills. Furthermore, in case C, the organisation does not have a strategy for the learning process, but they still expect blue-collar workers to quickly become familiar with the new technologies to carry on their job. The differences in terms of **flexibility in designing the learning process** can be derived from the fact that every organisation looks at the individual worker with individual needs and accordingly decides how to integrate those needs within the designated training programme; thus, as the HR manager of case A stated: *"Within this environment, we of course look at the strengths and weaknesses and further adapt our programme correspondingly"* (participant 2).

Interestingly, participants from all cases mentioned that there are not many restrictions regarding the planning of the learning process, providing blue-collar workers with a lot of flexibility in reaching their learning goals. Additionally, there may be two other factors in relation to the flexibility of the learning process: the amount of diversity in educational levels and the fact that blue-collar workers are not always motivated to work on their learning goals. Participant 4 stated: "*They check whether you have completed all the steps. I just think that they can check more in between to keep them motivated, which is sometimes lacking*".

Moreover, in case A, participants revealed that their manager and two employees, hired specifically to support the learning process, are responsible for the blue-collar workers' learning progress as HR is overly occupied. Similarly, in case C, HR is not involved in the learning process since this is not preferred due to the organisational culture; however, it is expected that they provide information or advice regarding training and education if requested. Their employee handbook (personal communication, May 15, 2024) confirmed that it is the responsibility of the manager to stimulate blue-collar workers to develop themselves as well as identify development needs. Conversely, in case B, HR has a very active role in the learning process as they have to ensure that all blue-collar workers receive the necessary information.

Overall, all organisations use a variety of information facilities during the learning process, as information is currently written down on paper or verbally transmitted on the work

floor. Participants claimed that, given that they can consult the information on the work floor, this is an accessible way to get accurate information during the work process. However, in case B, there is a growing demand to digitise the information to make it more comprehensible:

> Look, e-learning would be best for the future. But by having folders, employees can look things up independently or, of course, ask the mentor right away. I think this could be further digitized. But as a team leader, I try to encourage people to do this so that employees can find more things digital, for example (participant 5).

Additionally, in terms of learning facilities, all organisations use a computer programme that enables blue-collar workers to learn skills. Whereas in case A, the organisation implemented an online learning environment connected to TWI, which considers the specific needs or preferences of the blue-collar workers. Also, the HR manager and the manager in this case confirmed the need for advanced learning using technology, so the online programmes can be exploited for training within multiple contexts. In case B, there is less need for online training programmes as *"it is not so complicated to learn new things that I think it is profitable"* (participant 5). Besides, in case C, according to the HR manager, there is the belief that learning on-the-job yields the most effective results, as the best way to learn is to figure it out yourself.

Moreover, the amount of **managerial support** and motivation that blue-collar workers receive from their manager in the learning environment differs profoundly in all cases. In case B, there is always a staff member available to ask questions during their learning process. Additionally, the managers strive to find ways to improve the learning conditions of the blue-collar workers, as all participants in this case confirm that their tasks are often repetitive. Likewise, in case A, the blue-collar workers are being supported by their manager if they have the ambition for further development; also, the organisation *"tries to work together with their employees to see how the work can be made more fun but also easier for them"* (participant 3).

In case C, the HR manager sees the role of the manager in the learning environment differently than the blue-collar workers because, according to the HR manager, blue-collar workers receive no assistance from their manager as they need to figure it out by themselves so they can show it to their teammates. *"Here, they have the mindset that we have to teach each other things or that you have to figure it out yourself. They do not have much support here"* (participant 7). The other participants in this case mentioned that the manager has an active role in their learning process, providing them with the right tools. These distinct opinions are related to the organisational culture, in which the HR manager claims that support is not

considered necessary, even though blue-collar workers disagree because they are used to this kind of support. Furthermore, participants in cases B and C claimed that HR and their manager play a minor role in creating a learning environment, as the current environment provides an adequate learning environment with enough opportunities for personal growth. However, in case A, there is not yet a good learning environment, as the HR manager highlighted:

> So, we do not have a very good learning environment for production or for the office. I do think it would be good to give this more structure. But this is not the highest priority. We may also be a somewhat smaller organisation with 85 employees. So I wouldn't call it a learning environment or a digital learning environment (participant 2).

4.5. Role of organisational factors in facilitating self-regulated learning

In all cases, it has been affirmed that the **organisational culture and structure** have a significant impact on the learning process of blue-collar workers. In case B, even though there is a hierarchical structure, the management of the organisation is readily accessible. However, the organisational culture does influence the learning process as it prioritises criticism over positive formulated feedback. Participant 5 stated: *"If someone does something wrong now, it will be dealt with immediately"*. This statement supports the idea that there is a strict organisational culture in which blue-collar workers are held accountable for their errors. Conversely, in case A, the organisational structure can be described as flat, with a high degree of employee involvement within an organisational culture that is transparent with a high amount of trust in their employees. *"It is really a family business; you can see this in the workplace. Everything is often approached in a positive way. You talk about it when there are problems without creating a whole new problem, for example"* (participant 4).

On the other hand, in case C, the organisational culture has a major influence on the learning process of the blue-collar workers, at least according to the HR manager, as it can be described as a culture in which employees have a 'wait-and-see attitude' because they are not informed about organisational developments. Additionally, change is perceived as unnecessary, even if it means that certain work activities can be improved. Furthermore, diversity in terms of employees plays a major role in this organisational culture, as certain cultures are very dominant within the hierarchy. However, blue-collar workers who have been working at the organisation for a very long time have become so ingrained in the organisational culture that they are no longer aware of how it affects them:

> When I started here, I had a lot of trouble feeling at home. Because of the dominant Japanese culture and Turkish culture, I felt alone. Only I have never been averse to working, and luckily the Japanese saw that. Every three years I have been given a new position; luckily, they always came up with the idea themselves. This gives me a lot of variety in my work. That's why I ended up staying (participant 8).

In both cases (A and B), there is also a lot of diversity in terms of blue-collar workers, but this does not affect their work environment as there is not one culture that dominates on the work floor, and most blue-collar workers are temporary workers. However, the integration of technology in the work environment did affect the temporary workers within the organisations and, therefore, the staff capacity, as fewer temporary workers are hired. This allowed blue-collar workers in a stable employment to move on to another position in the organisation if that was possible, as well as take on additional tasks previously performed by temporary workers.

Moreover, another organisational factor that contributes to the learning process of blue-collar workers is the HR policy. In cases A and C, there are few formal requirements as the organisations rely on information from their employee handbook during the learning process. It has been supported within the training and development policy of case C (personal communication, May 15, 2024) that the development opportunities are not documented, which could lead to different interpretations of how blue-collar workers are educated. Participants highlighted that the majority of the standards and guidelines concentrate on managing a robot or machine. For instance, in case A, they follow the standards of TWI, as *"we have not also drawn up a whole policy"* (participant 3).

Building upon the above findings, a comparison matrix of the specific characteristics per case as well as the similarities between all cases has been presented; see Table 4. Since each specific characteristic within a case is listed in the same order as within the other cases, it is easier to determine how one case differs from other cases on certain aspects derived from the data. Moreover, the overarching similarities have been presented in the table's final column.

Table 4
Results comparison matrix

Overarching themes	*Specific characteristics case A*	*Specific characteristics case B*	*Specific characteristics case C*	*Similarities between cases*
Embracing technology-driven change	• Medium extend work automated • Adoption phase • More as well as less complexity due to technologies	• High extend work automated • Post-adoption phase • Less complexity due to technologies	• High extend work automated • Post-adoption phase • Less complexity due to technologies	• Technologies affect work activities
Essential skills blue-collar industry	• Intermediate vocational level four • Learning in teams or individually	• Intermediate vocational level one or two • Learning on an individual level	• Intermediate vocational level one or two • Learning on an individual level	• Few job-requirements • Difficult to define essential skills • Same required characteristics
Upskilling through self-regulation	• Established personal development budget • Learning goals linked to TWI	• Established personal development budget • Learning goals linked to a competency-based system	• No established personal development budget • Learning goals linked to an assessment system	• Offer development opportunities • High degree learner autonomy • Few requirements learning goals • Evaluating learning performance is the most important factor • Bonus as an external motivator • Feedback to adjust learning goals • Managerial support from the organisation necessary
Facilitating self-regulated learning	• Learning process designed based on TWI • HR not involved in the learning process as it is overly occupied • Growing demand for digitalization in the learning process • Manager available in the learning environment • No adequate learning environment	• Learning process designed based on availability of mentor • HR has a very active role in the learning process by providing information • There is no demand for digital learning as it is not so difficult to learn new things • Staff members are available in the learning environment • Adequate learning environment	• There is no strategy in terms of designing the learning process • HR is not involved in the learning process due to organisational culture • No demand for digital learning; instead, learning on-the-job • Contrasting opinions about role manager in the learning environment • Adequate learning environment	• Focus design learning process on the needs of the individual worker • Flexibility in reaching learning goals • Necessary information on paper or verbally transmitted
Role of organisational factors	• Strict hierarchical culture that prioritises criticism over positive feedback • Not one culture is very dominant in the work environment	• Flat organisational culture with a high degree of employee involvement • Not one culture is very dominant in the work environment	• Wait-and-see culture in which change is not seen as necessary • Certain cultures are very dominant in the work environment	• Decreased staff capacity as an effect of the integrated technologies • A few formal requirements within the learning process • Guidelines are very often consulted during the learning process

Note. Overview differences and similarities per case. Own work.

5. Discussion

This final chapter answers the main research question. In addition, theoretical contributions and practical implications are provided, as well as limitations and directions for future research.

5.1. Conclusion

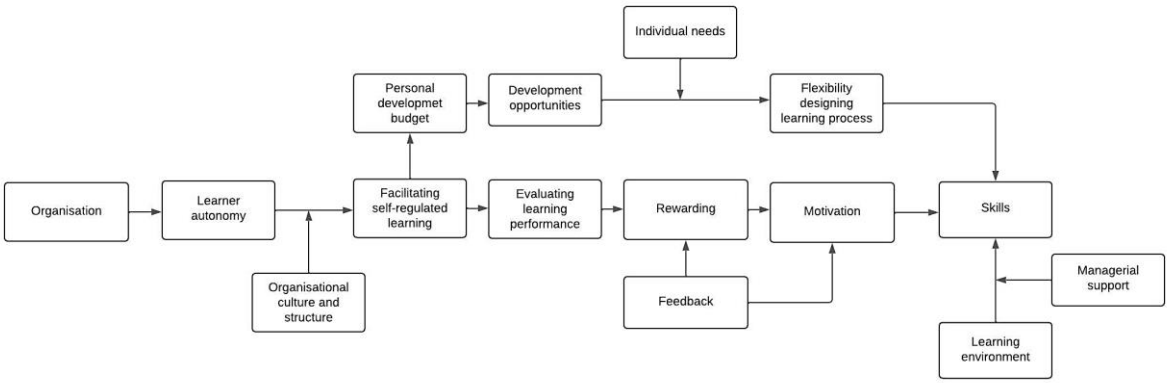
This research aimed to gain insights into how organisations within the blue-collar industry facilitate self-regulated learning of skills for blue-collar workers, which led to the following research question: *How do organisations within the blue-collar industry facilitate self-regulated learning of skills for blue-collar workers?* Two sub-research questions have been examined to answer this research question. The first sub-research question is: *What are self-regulated learning practices for blue-collar workers?* and the second sub-research question is: *How can an organisation facilitate self-regulated learning?* The findings of this study demonstrated that organisations in the blue-collar industry allocate their blue-collar workers a high degree of **learner autonomy**, which influences how self-regulated learning is facilitated. This is because blue-collar workers have access to a **personal development budget**, which enables them to take charge of the acquisition of skills as the organisation provides a range of **development opportunities**, such as a training programme, guidance from a mentor, or the opportunity to learn on-the-job.

Moreover, blue-collar workers receive a high degree of **flexibility in designing their learning process**, as organisations consider the individual needs when adapting self-regulated learning practices to the individual blue-collar worker. Building on the self-regulated learning practices, two practices are important for blue-collar workers: the **evaluation of the learning performance** and **feedback**. The evaluation of the learning performance is linked to a bonus system, as blue-collar workers receive a reward based on their performance from the previous year. Receiving a bonus as external motivator for acquiring skills enhances the motivation of the blue-collar worker to invest in their personal development; however, this requires feedback to adjust the learning goals in a timely manner to increase the chance of a positive evaluation.

Furthermore, differences between cases showed that **organisational culture and structure** affect how the self-regulated learning process is facilitated. The learning process is negatively affected by high levels of criticism or decreasing interest in change, as seen in case B's strict and hierarchical culture and case C's wait-and-see culture. Conversely, a flat and transparent culture, as noted in case A, encourages employee involvement concerning learner autonomy. Moreover, the amount of **managerial support** has a substantial role in the learning environment. Managers can support blue-collar workers within their learning environment, as

in both cases A and B, by facilitating various opportunities for personal growth as well as stimulating blue-collar workers to consider the possibilities of pursuing training and education to develop skills. A framework for the identified process is demonstrated in Figure 2.

Figure 2
Self-regulated learning process of blue-collar workers



Note. Identified process self-regulated learning within blue-collar industry. Own work.

5.2. Theoretical contributions

While the findings of this study are, to a certain extent, consistent with the body of literature on self-regulated learning within organisations, they also provide new insights. First of all, it was expected that blue-collar workers had to expand their range of skills and take on new tasks (Roblek et al., 2016). The findings of this study mainly reflect these expectations, as blue-collar workers had to adjust to a different way of working because they had to learn how to manage a robot or machine. However, this research has shown that tasks are getting easier to perform as well as that the integration of technology did not affect the job requirements of blue-collar workers because they were not required to expand their skill set. This contradicts the study by Ras et al. (2017), which argues that technological innovation asks for continued skill development. Furthermore, previous studies highlighted that skills are fundamental to enable blue-collar workers to perform their job which are related to know-how, traits, and characteristics developed through training, practice, or experience (Adeyemo, 2010). Moreover, existing literature emphasised that there are no formal job-requirements as they acquire skills by experience (Mittal et al., 2019). This study showed that due to the easy of the work anyone may acquire the skills required to perform as a blue-collar worker which therefore corresponds with existing research.

Additionally, previous studies emphasised that the process of self-regulated learning consists of three phases: *forethought*, *performance*, and *self-reflection*, in which underlying strategies and variables have been extracted (Lourenco & Ferreira, 2019; Zimmerman, 2002). Yet, the findings of this study demonstrated that the blue-collar industry does not maintain the same self-regulated learning practices as goal setting is not identified as an important self-regulated learning practice since there are no personal development goals. However, evaluating the learning performance and feedback play an active role in the learning process. Blue-collar workers who receive feedback and are rewarded for their performance enhance their motivation to invest in further development. Therefore, this research offers a broader understanding of how rewarding in relation to evaluating the learning performance can be placed within the self-reflection phase (Zimmerman, 2002). Overall, this study provides an understanding of how self-regulated learning practices are translated into the workplace of blue-collar workers that leads to the acquisition of skills (e.g., Endedijk & Cuyvers, 2022; Kyndt & Baert; 2013).

Furthermore, existing literature demonstrated that self-regulated learning encompasses the ability of a learner to take the initiative to monitor their understanding of the learning process (e.g., Zimmerman, 2002). The findings of this study confirm that taking initiative within the learning process is important for blue-collar workers as all organisations provide their workers with learner autonomy which can be defined, within the context of the blue-collar industry, as the degree of autonomy that learners receive over their learning process in relation to, for example, a personal development budget or development opportunities. Moreover, the findings of this research demonstrated that a flat and transparent organisational culture has a positive effect on the learning process, whereas a wait-and-see culture or a strict and hierarchical culture has a negative impact, which is consistent with the study of Tan (2023) that argued that organisations have to facilitate an open culture which encourages the learners.

Additionally, as managerial support has been highlighted to be an important factor within the learning environment of blue-collar workers, this study contributes to the further examination of learning conditions, such as a guiding manager or managerial support for learning (Skule, 2004; Tan, 2023). Besides, the findings of this study indicate that managers stimulate blue-collar workers to pursue training and education for skill development which adds to previous studies on how managers influence blue-collar workers within the learning environment (Mohammed & Ali, 2016) Finally, this study adds to the existing literature on self-regulated learning within the context of the blue-collar industry since previous studies researched other workplace contexts (e.g., Kurt & Eskimez, 2022; Littlejohn et al., 2016).

5.3. Practical implications

This study also has some practical implications. First of all, to allow organisations within the blue-collar industry to facilitate self-regulated learning for blue-collar workers, organisations have to stimulate their managers to recognise as well as support self-regulatory behaviour of blue-collar workers. A well-known tool that supports self-regulatory behaviour is the application of a personal development plan which provides blue-collar workers with the opportunity to engage in learning activities to increase their learning performance (e.g., Kicken et al., 2009; Lejeune et al., 2018). The findings of this study confirmed that within organisations learner autonomy is provided, hence, the application of a personal development plan might enable blue-collar workers to ultimately manage their learning process. At the same time, managers bear the responsibility to create a learning environment that provides opportunities for personal growth as for the development of skills.

Additionally, this research offered valuable insights into evaluating the learning performance, which appears to be an important self-regulated learning practice for blue-collar workers. Organisations could facilitate managers with guidelines that they can apply when assessing the learning goals in which they identify criteria for success, such as achieving the desired outcome or showing significant improvement in the learning process. This will allow blue-collar workers to receive an evaluation that corresponds with their performance from the previous year, even if the evaluation might be less satisfactory than expected. Besides, evaluating the learning performance may be improved to ensure continuous evaluation rather than just at the annual appraisal. This is because it has been confirmed that receiving a positive evaluation enhances the motivation of blue-collar workers to invest in their personal development, which in return leads to the acquisition of skills.

Moreover, it has been emphasised throughout this research that the integration of technologies has implications for the blue-collar industry, however; smart technologies can also offer opportunities for the future as tools may be developed that help with the acquisition of skills to adapt to the changing workforce. For instance, the concept of learning analytics has been highlighted by Littlejohn (2017) which can provide blue-collar workers with tailor-made feedback using dashboards with graphical representations of the current and historical state of a self-regulated learner, providing exactly the amount of support necessary to optimise the learning process. That is, feedback has been confirmed to be an important self-regulated learning practice with room for improvement; therefore, this might be a first step towards the development of providing feedback on a regular basis within the learning process.

5.4. Limitations and directions for future research

Within this section, the limitations and directions for future research will be discussed. The first limitation is that the data necessary to answer the research questions was obtained at one point in time, providing a static viewpoint on the process of self-regulated learning as participants have been asked about their opinions and feelings regarding past experiences. Therefore, the full potential of the model of Zimmerman (2002), which describes the self-regulated learning process, was not fully explored. Additionally, several self-regulated learning practices, such as goal setting within the forethought phase, are less important in the self-regulated learning process of blue-collar workers. The question therefore arises what kind of effect this has on the cyclical nature of the model as the cycle repeats itself after the individual reflects on the outcome and adapted changes (Zimmerman, 2002). Future research should, therefore, examine if blue-collar workers can truly achieve self-regulated learning, even if not all self-regulated learning practices defined in the model of Zimmerman (2002) have been integrated in the self-regulated learning process of blue-collar workers. Hence, longitudinal research might help to empirically investigate the cyclical nature of the process of self-regulated learning within the blue-collar industry.

Furthermore, the sample size of this research was restricted to three organisations within the blue-collar industry, potentially limiting the generalisability of the findings. However, the findings of this study are to a certain extent transferable to organisations within the blue-collar industry as purposeful sampling as well as homogeneity purposeful sampling has been applied that gained insights into a group of participants with shared characteristics as well as it allowed to gather more in-depth-data regarding a smaller group of participants. Although the sample size might not represent all different ways on how organisations facilitate self-regulated learning for blue-collar workers, it would be recommend to replicate this study on a large scale for an extensive representation of the blue-collar industry as well as to capture more perspectives and opinions regarding the research topic. Moreover, in relation to the framework that has been developed, future research should focus on expanding this framework to draw conclusions that may offer more generalisable findings regarding the identified concepts. Finally, during this research it became clear that the evaluation of the learning performance and providing feedback was positively related to receiving a reward that enhances the motivation of the blue-collar worker; however, it was not examined when exactly a reward enhances the blue-collar worker's motivation, hence, further examination is required to obtain a deeper understanding of, for example, the right amount of this reward.

5.5. Final conclusion

This study explored how organisations within the blue-collar industry facilitate self-regulated learning for blue-collar workers. Within three cases, several self-regulated learning practices have been highlighted, such as evaluating the learning performance and providing feedback. Having learner autonomy in combination with a certain amount of managerial support within the organisational culture and structure were found to be influential factors regarding the facilitation of self-regulated learning. Overall, the findings align with the body of literature but also offer new insights. This study provides practical insights for organisations and managers that are involved in the personal development of blue-collar workers to make them more aware of the role of self-regulated learning practices within the learning process.

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Appendices

Appendix A: Interview guide

Allereerst hartelijk dank voor uw deelname aan dit onderzoek en voor uw tijd. Mijn naam is Esmee Hermsen en voor mijn masterscriptie aan de Radboud Universiteit in Nijmegen doe ik onderzoek naar hoe organisaties zelfregulerend leren binnen de blue-collar industrie zoals een productiebedrijf of een distributiebedrijf (logistiek). Het doel van dit interview is om inzicht te verkrijgen in de manier waarop leren wordt gefaciliteerd binnen een organisatie die recentelijk technologische veranderingen binnen het werkproces heeft meegemaakt. Daarom zou ik graag uw mening en ervaringen willen horen. Mochten er tijdens het gesprek vragen zijn, aarzel dan niet om deze te stellen als iets onduidelijk is of nadere toelichting nodig heeft. Ik verwacht dat het interview in totaal ongeveer 30 tot 45 minuten zal duren.

Voordat we beginnen is het belangrijk om te weten dat dit interview geanonimiseerd zal zijn, wat betekent dat er in dit onderzoek geen persoonlijke gegevens of zelfs de naam van de organisatie getoond zullen worden. Deze gegevens zijn alleen bij mij bekend en worden uiteraard zorgvuldig behandeld. Mocht u zich tijdens dit interview of later in dit onderzoek willen terugtrekken, dan is dat ook mogelijk. Om de gegevens na het interview te kunnen analyseren, zou ik willen vragen of ik dit interview door middel van een audio-opname mag opnemen, zodat ik het kan transcriberen. Het audiofragment wordt alleen gebruikt bij het analyseren van de informatie en zal daarom na afronding van dit onderzoek direct worden verwijderd. Nadat de transcriptie van het interview klaar is, krijgt u de gelegenheid deze te bekijken om er zeker van te zijn dat er geen inconsistenties zijn of om te zien of er dingen zijn die u graag verwijderd wilt hebben.

Dus als er op dit moment geen verdere vragen zijn, wil ik graag beginnen met het interview.

Appendix B: Operationalization

An operationalization of the abstract concepts, see Table B1, has been created in which variables, dimensions, indicators, and example questions are provided.

Table B1
Operationalization concepts

Variables	Dimensions	Indicators	Example questions
Skills	Hard skills	Training and education	Wat voor training of opleiding kan een [*blue-collar worker*] volgen?
	Soft skills	Self-improvement	Wat voor eigenschappen passen bij een [*blue-collar worker*]?
Process of self-regulated learning	Forethought phase	Task analysis	Kun je iets meer vertellen over hoe deze leerdoelen zijn opgesteld?
		Self-motivation beliefs	Wat doet je baas om je te helpen met het behalen van deze leerdoelen?
	Performance phase	Self-control	Hoe zorg je ervoor dat je functie hierbij blijft aansluiten?
		Self-observations	Wat doe je er zelf aan om vooruitgang te maken als je iets nieuws wilt leren?
	Self-reflection phase	Self-judgement	Stelt jouw baas ook bepaalde eisen aan wat je uiteindelijk moet bereiken?
		Self-reaction	Hoe zorg je ervoor dat je gemotiveerd blijft om te leren?
Facilitating self-regulated learning in organisations	Learning environment	Structure	Hoe ziet de leeromgeving van de [*blue-collar workers*] eruit? (bijvoorbeeld wat voor faciliteiten of manieren van ondersteuning zijn er)
		Technology	Zijn er ook technologieën die worden gebruikt in de leeromgeving? (zoals digitale ondersteuning, gebruik van computerprogramma's)
		Support supervisor or manager	Wat voor ondersteuning krijg je van je baas tijdens je leerproces?
		Policies	In hoeverre heeft de organisatie een beleid opgesteld voor het leerproces?

	Learning conditions	Opportunities or challenges	Hoe probeer je de [*blue-collar workers*] uit te dagen om iets te leren?
		Managerial responsibilities	Hoe zou je de rol van je baas en van HR omschrijven tijdens je leerproces?
		Access to information	Op welke manier krijg je de informatie die je nodig hebt tijdens je leerproces?
		Rewarding proficiency	Hoe laat het bedrijf waardering zien voor het leren van een vaardigheid?
		Learning resources	Wat voor leermiddelen (zoals oefenopdrachten of online cursussen) kun je gebruiken tijdens je leerproces?
		Organisational processes/culture	Hoe motiveert deze cultuur de medewerkers om te leren?
		Learning in a team	Wordt er binnen de organisatie ook gebruikgemaakt van leren in teams?

Note. Operationalization of abstract concepts based on the theoretical background. Own work.

Appendix C: Interview topic lists

BLUE-COLLAR WORKERS

1) Achtergrond informatie

- Hoelang werk je al bij [*naam organisatie*]?
    - Hoe vind je het om te werken bij [*naam organisatie*]?
- Mag ik vragen hoe oud je bent?
- Kun je iets meer vertellen over je baan?
    - Wat voor taken voer je dagelijks uit?
    - Wat vind je leuk aan je baan? Wat vind je minder leuk aan je baan?
- Wat is de laatste keer dat je moest leren werken met een nieuw apparaat of nieuwe technologie? (zoals een nieuwe machine, computer of robot)
    - Kun je iets meer vertellen over hoe dat ging?
    - Hoe vind je het om te werken met [*nieuwe technologie*]?
        - Wat voor ondersteuning heb je gehad toen je moest leren werken met [*nieuwe technologie*]?
            - Op welke manier heeft je baas of HR je hierbij geholpen?

2) Vaardigheden

- Wat moet je allemaal kunnen om je werk uit te kunnen voeren?
    - Wat voor soort persoon past bij de functie van [*functie*]?
- Stel, je wilt iets nieuws leren, hoe pak je het dan aan?
    - Wat zou je allemaal kunnen doen binnen het bedrijf?
    - Wat heb je hiervoor nodig van je baas of van HR?
- Heb je weleens een training of opleiding gevolgd via het bedrijf?
    - Wat voor training of opleiding was dit?
    - Zou het bedrijf een training of opleiding moeten aanbieden voor het leren van vaardigheden? (<u>mits niet al aanwezig</u>)
        - Wat voor training of opleiding zou dit dan moeten zijn?
- Heb je (nieuwe) dingen moeten leren toen je ging werken met [*nieuwe technologie*]?
    - Wat heb je moeten leren?

        - Kun je iets meer vertellen over hoe dit is gegaan?
        - Hoe helpt hetgeen dat je geleerd hebt met het werken met [*nieuwe technologie*]?

3) Proces van zelfregulerend leren – forethought phase

- Heb je weleens een jaargesprek met je baas?
    - Heb je het dan ook over het leren van nieuwe dingen?
- Heb je op dit moment iets dat je wilt bereiken als [*blue-collar worker*]?
    - In hoeverre heb je daar een plan voor?
- Zijn er op dit moment leerdoelen opgesteld?
    - Kun je een voorbeeld geven van één van je leerdoelen?
    - Kun je iets meer vertellen over hoe deze leerdoelen zijn opgesteld?
        - Op welke manier heeft je baas of HR je hierbij geholpen?
    - Zijn er afspraken gemaakt over het behalen van je leerdoelen?
        - Wat vind je van de ondersteuning vanuit het bedrijf om deze leerdoelen te behalen?
        - Wat doet je baas om je te helpen met het behalen van deze leerdoelen?

4) Proces van zelfregulerend leren - performance phase

- Wat is er volgens jou veranderd in je werkomgeving doordat je bent gaan werken met [*nieuwe technologie*]? (zoals andere taken of manier van werken)
    - Hoe ga je om met deze veranderende werkomgeving?
        - Hoe zorg je ervoor dat je functie hierbij blijft aansluiten?
        - Wat heb je hierbij nodig van je baas of van HR?
- Heb je het er weleens met je baas of HR over hoe het gaat met het aanleren van de [*nieuwe technologie*]?
- Wordt er weleens gemeten of je bepaalde leerdoelen hebt behaald?
    - Kun je iets meer vertellen over hoe dit wordt gedaan?
- Wat doe je er zelf aan om vooruitgang te maken als je iets nieuws wilt leren?
    - Heb je hierbij ondersteuning nodig vanuit je baas of vanuit HR?

5) Proces van zelfregulerend leren - self-reflection phase

- Vind je het leuk om te blijven leren?

- Hoe zorg je ervoor dat je gemotiveerd blijft om te leren?
    - Wat heb je hiervoor nodig?
        - Hoe zou je baas of HR je hierbij kunnen helpen?
- Stelt jouw baas ook bepaalde eisen aan wat je uiteindelijk moet bereiken?
    - Kun je iets meer vertellen over hoe je daarmee omgaat?
    - Hoe beoordeelt je baas uiteindelijk of je de eisen hebt gehaald?

6) Leeromgeving

- Hoe ziet volgens jou een omgeving eruit waar ook je collega's zich kunnen blijven ontwikkelen?
    - Vind je dat het bedrijf dit heeft?
    - Helpt deze omgeving je bij het leren van (nieuwe) dingen?
- Zijn er ook technologieën die worden gebruikt in de leeromgeving?
    - Kun je iets meer vertellen over hoe ze worden gebruikt?
    - Maken deze technologieën het volgens jou makkelijker of moeilijker om (nieuwe) vaardigheden aan te leren?
- Wat voor ondersteuning krijg je van je baas tijdens je leerproces?
    - Kun je hier een voorbeeld van noemen?
    - Wat voor ondersteuning krijg je vanuit het bedrijf?
- In hoeverre heeft het bedrijf je leerproces al van tevoren vastgelegd?
    - Kun je iets meer vertellen over wat dit voor jou betekent?

7) Leercondities

- In hoeverre daagt je baas je uit om iets nieuws te leren?
- Hoe zou je de rol van je baas en van HR omschrijven tijdens je leerproces?
    - Krijg je feedback van je baas tijdens je leerproces?
- Op welke manier krijg je de informatie die je nodig hebt tijdens je leerproces?
    - Wat vind je van deze manier van het ontvangen van informatie?
- Hoe laat het bedrijf waardering zien voor het leren van een vaardigheid?
- Wat voor leermiddelen (zoals oefenopdrachten of online cursussen) kun je gebruiken tijdens je leerproces?
    - Zijn er nog leermiddelen die je mist?
- Hoe zou je de cultuur van het bedrijf omschrijven?
    - Motiveert deze cultuur je om iets nieuws te leren?

- Wordt er binnen het bedrijf ook gebruikgemaakt van leren in teams?
    - Kun je iets meer vertellen over hoe dit eruit ziet?
        - Vind je het prettig om te leren in een team?

8) Extra informatie

- Heb je nog andere vragen?
    - Is er nog iets wat onduidelijk is wat betreft het onderzoek?

MANAGERS

1) Achtergrond informatie

- Kun je iets vertellen over je functie?
    - Wat voor taken voer je dagelijks uit?
- Hoelang werk je al bij [*naam organisatie*]?
    - Hoelang werk je al als [*functie*] bij [*naam organisatie*]?
    - Hoe vind je het om te werken bij [*naam organisatie*]?
- Wat is de laatste keer dat er een nieuw apparaat of nieuwe technologie (zoals een nieuwe machine, computer of robot) werd geïntroduceerd?
    - Kun je iets meer vertellen over hoe dit ging?
    - Hoe vind je het om te werken met [*nieuwe technologie*]?
    - Op welke manier heb je de [*blue-collar workers*] leren werken met de [*nieuwe technologie*]?
        - Hoe heb je ze hierbij kunnen ondersteunen?

2) Vaardigheden

- Welke vaardigheden moet een [*blue-collar worker*] hebben?
    - Wat voor eigenschappen passen bij een [*blue-collar worker*]?
- Hoe pak je het aan als een [*blue-collar worker*] iets nieuws wilt leren?
    - Wat voor faciliteiten zijn er vanuit de organisatie?
    - Heb je hierbij ondersteuning nodig vanuit HR?
- Wat voor training of opleiding kan een [*blue-collar worker*] volgen?
    - Wordt er een training of opleiding aangeboden voor het leren van bepaalde vaardigheden? (<u>mits niet al aanwezig</u>)
        - Hoe zou deze training of opleiding eruit moeten zien?
- Heb je de [*blue-collar workers*] (nieuwe) vaardigheden moeten aanleren toen ze gingen werken met [*nieuwe technologie*]?
    - Welke vaardigheden heb je moeten aanleren?
    - Kun je iets meer vertellen over hoe dit is gegaan?
    - Hoe helpen volgens jou deze (nieuwe) vaardigheden de [*blue-collar workers*] met het werken met [*nieuwe technologie*]?

3) **Proces van zelfregulerend leren – forethought phase**
   - Stel, een [*blue-collar worker*] wil iets nieuws leren, hoe zou dit proces er van het begin tot aan het eind uit kunnen zien?
     - Hoeveel vrijheid krijgen ze om hun leerproces in te richten?
   - Wordt er van tevoren een planning gemaakt van hun leerproces?
     - In hoeverre is HR hierbij betrokken?
   - Worden er met de [*blue-collar workers*] leerdoelen opgesteld?
     - Hoe worden de leerdoelen opgesteld?
     - Zijn er afspraken gemaakt over het behalen van de leerdoelen?
       - Wat voor ondersteuning biedt de organisatie aan de medewerkers bij het behalen van deze leerdoelen?

4) **Proces van zelfregulerend leren - performance phase**
   - Wat is er veranderd in de werkomgeving van de [*blue-collar workers*] doordat ze zijn gaan werken met [*nieuwe technologie*]?
     - Hoe ondersteun je de medewerkers in deze veranderende omgeving?
       - Hoe zorg je ervoor dat hun vaardigheden blijven aansluiten bij de functie van [*blue-collar worker*]?
   - Hoe wordt de voortgang van de [*blue-collar workers*] gemeten als ze bezig zijn met het aanleren van bijvoorbeeld een nieuwe vaardigheid?
     - Op welke manier is HR hierbij betrokken?
   - Hoe wordt gemeten of ze de leerdoelen hebben behaald?
     - Op welke manier worden de leerdoelen bijgestuurd (mits nodig)?

5) **Proces van zelfregulerend leren - self-reflection phase**
   - Worden er bepaalde eisen gesteld aan wat [*blue-collar workers*] uiteindelijk moeten bereiken als ze iets nieuws willen leren?
     - Kun je iets meer vertellen over hoe dit wordt gecontroleerd?
     - Hoe vergelijk je uiteindelijk wat ze bereikt hebben met de eisen?
   - Hoe worden de [*blue-collar workers*] door de organisatie gemotiveerd om te blijven leren?
     - Hoe motiveer je je medewerkers als [*functie*]?

6) **Leeromgeving**

- Hoe ziet de leeromgeving van de [*blue-collar workers*] eruit? (bijvoorbeeld wat voor faciliteiten of manieren van ondersteuning zijn er)
    - In hoeverre is dit de beste leeromgeving voor de medewerkers?
- Zijn er ook technologieën die worden gebruikt in de leeromgeving? (zoals digitale ondersteuning, gebruik van computerprogramma's)
    - Kun je iets meer vertellen over hoe ze worden gebruikt?
    - Maken deze technologieën het volgens jou makkelijker of moeilijker om (nieuwe) vaardigheden aan te leren?
- Wat voor ondersteuning biedt de organisatie in zijn geheel?
- In hoeverre heeft de organisatie een beleid opgesteld voor het leerproces?
    - Kun je iets meer vertellen over hoe dit beleid wordt toegepast?
        - Zou je een voorbeeld kunnen noemen?

7) **Leercondities**

- Hoe probeer je de [*blue-collar workers*] uit te dagen om iets te leren?
- Hoe zou je jouw rol en de rol van HR omschrijven tijdens het leerproces?
    - In welke mate geef je feedback tijdens het leerproces?
- Op welke manier krijgen de [*blue-collar workers*] informatie die ze nodig hebben tijdens hun leerproces?
    - Wat vind je van deze manier van het ontvangen van informatie?
- Hoe laat de organisatie waardering zien aan hun [*blue-collar workers*] voor het aanleren van een (nieuwe) vaardigheid?
    - Hoe laat je als [*functie*] deze waardering blijken?
- Wat voor leermiddelen (zoals oefenopdrachten of online cursussen) worden er gefaciliteerd aan [*blue-collar workers*] tijdens hun leerproces?
    - Zijn er nog leermiddelen die je hieraan wilt toevoegen?
- Hoe zou je de cultuur van de organisatie omschrijven?
    - Hoe motiveert deze cultuur de medewerkers om te leren?
- Wordt er binnen de organisatie ook gebruikgemaakt van leren in teams?
    - Kun je iets meer vertellen over hoe dit eruit zien?

8) **Extra informatie**

- Heb je nog andere vragen?
    - Zijn er nog onduidelijkheden wat betreft het onderzoek?

HR

1) Achtergrond informatie

- Kun je iets vertellen over je functie?
    - Wat voor taken voer je dagelijks uit?
- Hoelang werk je al bij [*naam organisatie*]?
    - Hoelang werk je al als [*functie*] bij [*naam organisatie*]?
    - Hoe vind je het om te werken bij [*naam organisatie*]?
- Wat is de laatste keer dat er een nieuw apparaat of nieuwe technologie (zoals een nieuwe machine, computer of robot) werd geïntroduceerd?
    - Kun je iets meer vertellen over hoe dit ging?
    - Wat voor rol heeft HR gespeeld bij het introduceren van [*nieuwe technologie*] bij de [*blue-collar workers*]?
        - Hoe heb je ze hierbij kunnen ondersteunen?

2) Vaardigheden

- Hebben jullie een functieprofiel voor de functie van [*blue-collar worker*]?
    - Welke vaardigheden moet een [*blue-collar worker*] hebben?
    - Wat voor eigenschappen passen bij een [*blue-collar worker*]?
- Hoe pak je het aan als een [*blue-collar worker*] iets nieuws wilt leren?
    - Hoe wordt hierbij samengewerkt met hun leidinggevende?
    - Hoe zou je de rol van HR hierin omschrijven?
- Wat voor training of opleiding kan een [*blue-collar worker*] volgen?
    - Wordt er een training of opleiding aangeboden voor het leren van bepaalde vaardigheden? (<u>mits niet al aanwezig</u>)
        - Hoe zou deze training of opleiding eruit moeten zien?
- In hoeverre hebben de leidinggevende de [*blue-collar workers*] (nieuwe) vaardigheden moeten aanleren om te werken met [*nieuwe technologie*]?
    - Welke vaardigheden hebben ze moeten aanleren?
    - Kun je iets meer vertellen over hoe dit is gegaan?
    - Hoe helpen volgens jou deze (nieuwe) vaardigheden de [*blue-collar workers*] met het werken met [*nieuwe technologie*]?

3) **Proces van zelfregulerend leren – forethought phase**

- Hoe zou een leerproces van een [*blue-collar worker*] eruit kunnen zien?
    - Hoeveel vrijheid krijgen ze om hun leerproces in te richten?
- Wordt er van tevoren een planning gemaakt van hun leerproces?
    - Hoe verloopt hierbij de samenwerking met hun leidinggevende?
- Worden er met de [*blue-collar workers*] leerdoelen opgesteld?
    - Hoe worden de leerdoelen opgesteld?
        - Wat is de rol van HR bij het opstellen van deze leerdoelen?
    - Zijn er afspraken gemaakt over het behalen van de leerdoelen?
        - Wat voor ondersteuning biedt de organisatie aan de [*blue-collar workers*] bij het behalen van deze leerdoelen?

4) **Proces van zelfregulerend leren - performance phase**

- Wat is er veranderd in de werkomgeving van de [*blue-collar workers*] doordat ze zijn gaan werken met [*nieuwe technologie*]?
    - Hoe ondersteunt HR de medewerkers in deze (nieuwe) omgeving?
        - Wat doet HR om ervoor te zorgen dat de vaardigheden blijven aansluiten bij de functie van [*blue-collar worker*]?
- Hoe worden de leerprestaties van de [*blue-collar workers*] gemeten?
    - Op welke manier is HR hierbij betrokken?
- Hoe wordt gemeten of ze de leerdoelen hebben behaald?
    - Op welke manier worden de leerdoelen bijgestuurd (mits nodig)?

5) **Proces van zelfregulerend leren - self-reflection phase**

- Welke standaarden stelt de organisatie aan de leerprestaties van de [*blue-collar workers*]?
    - Kun je iets meer vertellen over hoe deze worden gehandhaafd?
    - In hoeverre vergelijkt de organisatie de prestaties van de [*blue-collar workers*] met de standaarden?
- Op welke manier worden de [*blue-collar workers*] door de organisatie gemotiveerd om te blijven leren?
    - Hoe motiveer je je medewerkers als [*functie*]?
    - Op welke manier stimuleer je de leidinggevenden om hun [*blue-collar workers*] te motiveren?

6) Leeromgeving

- Hoe ziet de leeromgeving van de [*blue-collar workers*] eruit?
    - Hoe faciliteert deze omgeving het leren van (nieuwe) vaardigheden?
    - In hoeverre is dit de beste leeromgeving voor de medewerkers?
- Zijn er ook technologieën die worden gebruikt in de leeromgeving?
    - Kun je iets meer vertellen over hoe ze worden gebruikt?
- Wat voor faciliteiten zijn er voor de medewerkers?
        - Kun je hier een voorbeeld van noemen?
- Wat voor ondersteuning biedt de organisatie in zijn geheel?
- In hoeverre heeft de organisatie een beleid opgesteld voor het leerproces?
    - In hoeverre is HR betrokken bij het opstellen van het beleid?
    - Kun je iets meer vertellen over hoe dit beleid wordt toegepast?
        - Zou je een voorbeeld kunnen noemen?

7) Leercondities

- Hoe probeer je de [*blue-collar workers*] uit te dagen om iets te leren?
- Hoe zou je de rol van HR en de leidinggevende omschrijven in het leerproces?
- Op welke manier krijgen de [*blue-collar workers*] informatie die ze nodig hebben tijdens hun leerproces?
    - Wat vind je van deze manier van het ontvangen van informatie?
- Hoe laat de organisatie waardering zien aan hun [*blue-collar workers*] voor het aanleren van een (nieuwe) vaardigheid?
    - Hoe laat je als [*functie*] deze waardering blijken?
- Wat voor leermiddelen (zoals oefenopdrachten of online cursussen) worden er gefaciliteerd aan [*blue-collar workers*] tijdens hun leerproces?
    - Zijn er nog leermiddelen die je hieraan wilt toevoegen?
- Hoe zou je de cultuur van de organisatie omschrijven?
    - Hoe motiveert deze cultuur de medewerkers om te leren?
- Wordt er binnen de organisatie ook gebruikgemaakt van leren in teams?
    - Kun je iets meer vertellen over hoe dit eruit zien?

8) Extra informatie

- Heb je nog andere vragen?
    - Zijn er nog onduidelijkheden wat betreft het onderzoek?
- Is het mogelijk om enkele documenten te ontvangen voor document analyse?

Appendix D: Coding data structure

A data structure of the codes, see Table D1, has been provided, which shows how the data got reduced from open codes to axial codes and ultimately to selective themes.

Table D1
Coding data structure

Selective	Axial	Open
Role of organisational factors in facilitating self-regulated learning	Business operations	HR policy
		Working with standards or regulations
		Recording processes
		Communication
	Employees	Staff capacity
		Diversity
		Employment history
	Empowerment	Autonomy
		Include employees in decision-making
		Management control
	Organisation	Organisation culture
		Organisation structure
	Work conditions	Work environment
		Workload
Embracing technology-driven change	Adaptation	Changing work activities
		Include employees in changes
	Technology	Automation
		Working with technologies
		Learning to work with technologies
		Development technologies
Essential skills blue collar industry	Job requirements	Requirements: Knowledge
		Requirements: Characteristics
		Requirements: Skills
	Teamwork	Collaboration
		Learning in teams
		Working in shifts
	Work activities	Work activities: blue-collar worker
		Work activities: manager
		Work activities: HR
	Development opportunities	Ambitions

Upskilling through self-regulation		Employee development opportunities
		Personal development budget
	Evaluation	Assessments
		Annual appraisal
		Feedback
		Appreciation
	Personal development	Learning goals
		Evaluate learning goals
		Learn new skills
Facilitating self-regulated learning	Leadership	Role: manager
		Support
		Encourage learning
		Motivate employees
	Learning facilities	Learning by using standards
		Learning by using technologies
		Learning environment
	Learning process	Design of the learning process
		Planning of the learning process
		Information dissemination
		Measure advancement in the learning process
		Role: HR
	Training	Participate in training
		Training methods
		Mandatory training or education

Note. Data structure of the open, axial and selective codes. Own work.

Appendix E: Reflection research process

To begin, this thesis has been a journey from start to finish, as every day it challenged me to look at it from a different perspective, and therefore it pushed me to write things over and over again until I found something that was of interest to add to the body of work. Before writing this thesis, I had already written a thesis for my HBO bachelor in Human Resources Management; however, as soon as I started, it became clear that an academic thesis requires a different way of thinking but also a more extensive literature review and data analysis. Especially when I started with the thesis, finding the right focus in terms of the research topic was an iterative process, which cost me a lot of time to delve into the literature on the subject. Later on, I noticed that this actually helped me gain sufficient insights into the research topic as well as underlying concepts that were not visible at first sight.

After finding the right focus, interviews needed to be conducted to gain insights into the research topic, which took almost a month before the first interviews could be conducted due to difficulties finding organisations interested in participating in this study, something that was not expected beforehand, giving me a lot of extra time pressure. However, I really enjoyed containing the interviews; participants gave me insights into their opinions and perspectives, which provided interesting information regarding the research topic. Moreover, as you spend a number of weeks conducting interviews, after each interview, it becomes clearer how the research topic relates to practice, which helps with coding the data and knowing which topics were mentioned repeatedly. Although I had to recode my data, which took me a lot of extra time, it provided me with a broader picture of the data, allowing me to interpret the findings on a more conceptual level that ultimately contributed to answering the research question.

Overall, as I look back at the research process, it was not an easy journey as it pushed me multiple times to cross my boundaries, especially as a perfectionist, as it gave me a lot of stress to integrate all the feedback, even though this also helped me enormously to bring my thesis to the next level. But, in the end, I am proud of what I was able to do in the last couple months and to deliver a finished product that I can look back on.