Barriers to Learning

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Identification and Measurement of Barriers to Learning at the Workplace in Vocational Education and Training (VET) and Consultancy

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Preface

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This is for you, Grandpa

For all your entirely true fairy tales

For all your lost words

For all our unfinished—but unforgotten—talks

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1 Introduction to Barriers to Learning at the Workplace

> "*The concept of learning throughout life thus emerges as one of the keys to the twenty-first century. It goes beyond the traditional distinction between initial and continuing education. It meets the challenges posed by a rapidly changing world. This is not a new insight, since previous reports on education have emphasized the need for people to return to education in order to deal with new situations arising in their personal and working lives. That need is still felt and is even becoming stronger. The only way of satisfying it is for each individual to learn how to learn*." (European Commission, 2020, 18)

"Learning or Leaving?" Puhakka et al. (2021) raise this provocative question in reference to individual and environmental factors that can determine the intention to stay at or leave a workplace, as related to the importance of learning behavior in and for the workplace. In the 21st century, learning is often regarded as "the treasure within" and lays the groundwork for lifelong learning in all its variations (Delors, 1996, p. 18). One key element of lifelong learning is the workplace: viewing it as a learning environment reveals enormous potential for learning opportunities, enrichments, and triggers. Therefore, to perform one's job at a top level, it is crucial to acknowledge the lifelong learning opportunities inherent to workplaces just as much as the competences required to face work-related challenges.

Despite the importance of lifelong learning and the development of various programs to foster learning throughout the lifespan of professional development, its necessity does not always lead to successful learning activities. Research has widely shared approaches that encourage learning for or at work (Billett, 2022; Kyndt & Baert, 2013; Pylväs et al., 2022), yet less is known about the struggles that impede, complicate, or disrupt learning attempts. This is a notable research gap, as failing to learn produces an incapacity to carry out assignments, achieve personal advancement, or hit objectives, corporate or personal. Still, according to the literature (Barrertt, 2021), the topic of barriers to learning is rather multiform and diversified, so it is difficult to understand the barriers that are experienced at the workplace, how they impact knowledge acquisition, and the fundamental aspects of their management. Especially the domain of Vocational Education and Training (VET) professionals in Germany are subject to high demands regarding professionalization. This implies a culture strongly committed life-long learning or continuous professional development (CPD). According to Wisshak and Hochholdinger (2018) their workplaces are heterogenous and often shaped by conflicting requirements. Although rarely investigated fostering

and hindering factors are relevant in every day learning of VET professionals at the workplace. As a result, there is an insufficient basis for professionalization processes, especially in the sense of developing vocational identity or forming a self-image of an occupational group, and classification in collective agreements (Di Maio, 2021).

Organizations with dynamic corporate cultures stimulate personnel to reach new heights with worker guidance and progress initiatives (Barrett, 2021; Schilling & Kluge, 2009), which have been proven to increase employee commitment, motivation, and overall proficiency (Crans et al., 2022; Decius et al., 2021). Nevertheless, at work, professionals may come across challenges to gaining knowledge if their commitment is lacking or when they see change as a threat. The initial step to overcome these challenges to learning is identifying what they are and who they affect. Breaking down these barriers is not specific to a certain place, however. Ranjbarfard et al. (2014) point out that they can come up almost anywhere when individuals seek to understand something new.

According to Crouse et al. (2011) and Shuck and Herd (2012), barriers to learning at the workplace specifically are factors that impede the launch of victorious learning, pause or postpone learning prospects, or end learning activities much earlier than intended. These hinderances can be internal, external, or a consequence of organizational correlation issues (i.e., organizational fit), and they can happen on the individual, team, or organizational level. External barriers are restraints to learning based on professional intelligence (Jordan, 2014) or restricted authority (Billett & Choy, 2013). Investigations indicate that motivating elements (Nouwen et al., 2021), social associations (Mishra, 2020), the overall structure and equipment of the workplace (Goller & Paloniemi 2022; Tynjälä, 2022), and further career progression (Puhakka et al., 2021) can all be external learning barriers. Meanwhile, internal barriers can be seen, for instance, in individual affinities that designate how, where, when, and why learning functions are adopted or declined. Lastly, organizational fit barriers relate to outside physical, intellectual, or emotional restrictions from work duties (Wagner & Harter, 2006; Wollard, 2011). They are detachment between learners and their everyday job requirements. Subsequently, fitting problems can be the destructive result of obstructions happening in an organization's arrangement. One example of a fitting issue is when workers do not follow organizational rules in a standardized procedure due to their belief that they are inefficient or do not tally with their own job inclinations.

By shifting the focus from solely fostering learning at the workplace to barriers to learning, it is possible to identify more than just the barriers themselves. It would broaden the view on how learning takes place, and what are inhibiting or fostering factors on individual, team, and organizational level. With this more holistic approach this thesis aims to achieve these four open issues within the German VET system.

- First, complex learning conditions in the workplace can be identified comprehensively rather than exclusively.
- Second, the barriers to learning that occur in daily work situations can be traced.
- Identified barriers can be used to develop a framework and even a questionnaire to detect both formal and informal barriers at the workplace.
- Fourth, this questionnaire can be used to design holistic learning environments for vocational education and training (VET) and training professionals.

Although existing research in the fields of workplace learning (Tynjälä, 2022), training (Wisshak & Hochholdinger, 2020), and VET professionals (Blank et al., 2022) considers learning a key source of professional development and performing highly demanding tasks, barriers to learning in combination with the actual learning conditions at work form an academic blind spot. Therefore, further research on barriers to learning at the workplace is crucial (Connolly et al., 2022; Gatzweiler et al., 2022; Goller & Paloniemi, 2022). There are three main shortcomings to address:

1) Though lately there is growing interest in VET professionals and their workplace learning, the current learning approaches do not consider the challenges and problems related to VET professionals' professional learning development.

Especially in workplace areas such as teaching and instruction, learning is essential to managing multiple labors and difficulties (Dymock & Tyler, 2018). This could incorporate CPD, formal training, and work-based learning prospects. Furthermore, current studies reflect on the factors that positively impact learning alone (Cerasoli et al., 2018; Kim et al., 2021; Louws et al., 2017). They center on learning conditions (Cerasoli et al., 2018; Lundkvist & Gustavsson, 2018) or the consequences of those conditions on a specific aspect of work learning and its attributes (Brion, 2021; Decius et al., 2021; Kim et al., 2021). Current research approaches also indicate the role of educational and teaching specialists as crucial negotiators in proficient learning (e.g., DiBenedetto, 2019; Fernández, 2013; Winch, 2020).

VET professionals are profoundly affected by in-house and external consultants who facilitate continual guidance and teaching. These educators, instructors, and tutors have an integral part to play in the achievements of the German VET system in particular. Moreover, they are pioneers in imparting learning and offering assistance to adapting to such elements as internationalization (Li & Pilz, 2021) and digitalization (Barabasch & Keller, 2021), both relevant to the workplace. Furthermore, these personnel are engaged in constructing corporate employee and organizational development processes. With the scarcity of capable workers and

the evolving learning preferences of youths, VET educators can be immensely beneficial to advancing the quality of a VET system. In sum, this necessitates a close look at VET professionals' actual challenges and problems, one that is missing from current research.

2) Though there are ground-breaking works on learning conditions in general (Eraut, 2004; Marsick & Watkins, 2001; Simons & Ruijters, 2004), those of professional trainers and training managers is widely underrepresented. Since the early 2000s, workplace learning research has mainly focused on factors that foster learning, ignoring the ambivalent potential of barriers to learning. Originating from Alderton's (1999) promotion of the attributes and oft-cited set of assurance, hurdles, and aid, research from this era unveiled various foundational findings on the learning circumstances at work (Ellinger, 2005; Eraut, 2004; Skule, 2004; Van Woerkom et al., 2002). Routine vocational contexts not only avail opportunities for informal learning, such as why individuals expect problem-solving replies, but also depend on distinct organizational features (Jeong et al., 2018).

The scope of training is deeply founded on comprehension at all stages. Those receiving the teaching critically monitor the setup (Böhn & Deutscher, 2021), but nevertheless, those functioning as professional trainers or training supervisors who are giving the teaching do not often have their educational activities at work acknowledged (Böhn & Deutscher, 2021). However, professional trainers and training managers work in many intricate and challenging circumstances. They rely on incessant education and specialist advancement to maintain a compulsory expertise level and stay informed of new improvements. Their duties are exceptionally difficult, complex, and ever-changing (Wisshak & Hochholdinger, 2018), as well as count on the reception of students, formation of trainings, training requirement assessments, and bookkeeping. In this way, learning is indispensable to supervising the various obligations and difficulties at work in these zones (Dymock & Tyler, 2018); interruptions, limitations, or barriers can form a serious threat to this learning. As such, there is need for a holistic reflection on missing learning conditions that considers facilitating factors and barriers to learning equally.

3) Though research addresses facilitating and hindering factors on theoretical (Shuck & Herd, 2012) and fundamental levels (Belling et al., 2004; Crouse et al., 2011; Jeong et al., 2018), an actual measurement of barriers to learning is missing.

While the past decade has seen extensive research on the benefits of learning in the workplace (Jeong et al., 2018; Kyndt et al., 2018), there is much less information available about

the obstacles that can arise when attempting to learn something new (Boeren, 2016). Regularly, barriers to learning are incorrectly recognized as an insufficiency or absence of desirable learning situations or helpful components (Keck Frei et al., 2021; Louws et al., 2017). Yet, learning barriers can present a question about what is not doing well and ought to be changed: for instance, miscommunication, inadequate workspace, or deficient autonomy (Brion, 2021; Decius et al., 2021; Kim et al., 2021). This is only visible when considering the complexity of barriers at the workplace. However, a measurement of barriers to learning at the workplace can detect and categorize them. This could help to design learning environments that fully address different learning approaches to support employees reach their full learning potential, or simply prevent barriers to learning the workplace where possible.

This thesis addresses these three research shortcomings. To determine where learning takes place in VET and the barriers to learning at the workplace that may occur, this thesis is guided by the overarching question, what are barriers to learning and how can they be measured? The following four sub-questions further structure the thesis:

1) What challenges and problems do VET professionals face in their professional development? (Study I)
2) What are the learning conditions and informal and formal learning activities of professional trainers and training managers? (Study II)
3) What are the experienced barriers to learning, and how can they be categorized? (Study II)
4) How can barriers to learning at the workplace be categorized and be measured? (Study III)

The next chapter (chapter 2) describes the theoretical foundation and conceptualization of learning. It also discusses the emerging perspectives on learning, referring to formal, non-formal, and informal learning as well as facilitators of learning. Chapter 3 focuses on where learning takes place in the German VET system. This covers conditions for reflexive professional actions, professional development, the professional domain in the VET system itself, and the concept of workplace learning. Chapter 4 presents the barriers to learning in detail, starting with general concepts of hindering factors and moving on to a review of barriers to organizational learning and the approach underlying this thesis. This includes a framework for barriers to learning at the workplace. Chapter 5 reveals the overall aim of this thesis and gives an overview of the studies. Chapters 6, 7, and 8 present the studies published in peer-reviewed journals, while chapter 9

summarizes the results of these studies. This includes their key findings, conclusions, possible limitations, and implications for practice and future research.

2 What Learning Can Be

This chapter gives an overview of the general approaches to learning. It covers the theoretical foundation and conceptualization of learning, including emerging perspectives on formal, non-formal, and informal learning, as well as facilitators of learning.

To understand and detect barriers to learning at the workplace, it is crucial to clarify where and how learning actually takes place. Learning occurs in contexts called learning environments in an individual process or as a series of interlocking processes that are formal or informal. According to Marsick and Watkins (2001), if the learning environment is formal, it has a clearly defined place of learning and explicit learning objectives and instruction. If the context is non-formal, it follows most settings of the formal context, but without a clear certification in general (Rosemann, 2022). If the context is informal, this environment does not focus on the transmission of knowledge but treats it as an additional factor (Kessels et al., 2011). However, Straka (2004) and Dohmen (2001) point out the different connotations of formal and informal learning and the resulting problems of research comparability. Following this idea, studies typically fall into three basic currents: studies that postulate a division between formal and informal learning with intermediate levels (Marsick & Watkins, 2015); studies that differentiate between formal and non-formal learning settings (e.g., Eraut, 2004); and studies that reject such a division entirely (e.g., Billett, 1995, 2022).

The following sections give an overview of the basic perspectives on formal, non-formal, and informal learning, setting the base for the subsequent section on facilitators of learning.

2.1 Emerging Perspectives on Learning

A uniform, well-founded definition seems difficult to achieve for a complex construct like learning. Learning does not take place in a detached way and cannot be reduced to a clear division of roles between students and teachers (Fenwick & Tennant, 2004). This construct is much more linked to current streams of teaching-learning research (Hager, 2019; Neaman & Marsick, 2018) and is thus not suitable for static analysis.

From these basic assumptions, it is necessary to conceptualize learning for the broad term it is. In this context, learning is much more than a permanent change in behavior based on experiences gained. According to Simon and Ruijters (2004), learning is an implicit as well as explicit mental and/or manifest activity or process by which changes in knowledge, skills, attitudes, or in the learning capacity of individuals, groups, and organizations occur. Accordingly, learning can be

understood as both a single action and a replicating sequence of events, as a process. Learners learn consciously and purposefully under guidance, or unconsciously without direct connection to or necessity for the given context (Crans et al., 2022). The effects of learning include cognitive as well as physical changes, too, which manifest as directly measurable changes in behavior, attitudes, and beliefs. Those involved in the learning process can stem from a teaching-learning situation and be individuals, groups of learners, and even organizations.

Behaviorist Approaches to the Learning Process

The concept of learning first entered behaviorism, psychology, and education in the 1930s. With its main proponents Watson, Pavlov, and Skinner, behaviorism arrived as the dominant current in the social sciences (Merriam, 2018). Behaviorist approaches assume a basic stimulus-response action in learning (Weinert, 1996); learning processes therefore take place as conditioning. Input in the form of stimuli, such as texts, is presented to the learner, and in the unspecified act of learning, the learner processes it into output, a reaction. With the goal of a comprehensive behavior prediction, this static system (up to the conditioning of the behavior) is only conditionally applicable to the various learning processes (Renkl, 2009). Furthermore, individual factors such as motivation to learn and contextual aspects (e.g., learning environment and its characteristics) hardly find representation in behaviorism. Rather, this view considers learning to be a complete version of the content to be taught through purposeful control.

Cognitivist Approaches to the Learning Process

In the wake of the cognitive turn, beginning in the 1970s, there was a move away from the beliefs of Watson and Skinner to capture the concept of learning (Merriam, 2018). In early cognitivist approaches, learning was understood as the structuring and restructuring of patterns of memory and knowledge. The teaching-learning setting envisioned an almost complete transfer of knowledge content from a knowing person to a learning person through appropriate strategies (Svinicki, 1999). For this purpose, in contrast to the previous behaviorist view of learning, the content was increasingly focused. Early cognitivist strategies considered learners' cognitive abilities and limitations, as well as understand them as passive recipients of what is to be learned. In the second phase of the cognitivist model, this view changed. Active, direct influence on what is to be learned was accepted to occur through reflection on the content (Jarvis, 2010). Through this metacognition, the learner influences the conception, changes its content, or adds interpretive aspects. In this way, the learning content is no longer just processed but enriched by learners'

personal backgrounds. Approaches were now learner-centered or self-initiated. In the current third stage, focus is now placed entirely on the learner (Merriam, 2018), with facets of social cognition or situated cognition addressing the learner's exact needs. In addition to motivation, it is now notions of one's self-efficacy and epistemological beliefs that are influential (Svinicki, 1999).

Constructivist Approaches to the Learning Process

In the constructivist current, focus is placed on learners, their perceptions of reality, and their orientation to needs. Learners are understood in moderate constructivism as subjects who actively develop their own reality (Renkl, 2009). In doing so, they proceed in a largely self-determined manner, interpreting their views on learning content, needs, experiences, and reflections to adapt their learning. Consequences of this interpretation are situation-centered, problem-oriented approaches with high authenticity for the learner. Thus, the change from an authoritarian system to an experiential process constructed independently by the learner takes place. Knowledge and therefore also cognition about the nature of the world is now an individually constructed model. General bindingness subsequently emerges through a collective process of communication that transforms the separately constructed body of experience, step by step, into a socially shared or used body of knowledge (Merriam, 2018). This social aspect, in conjunction with contextuality, forms a central point of constructivism. Both enable learners to design their learning environment in such a way that it can be adapted to their personal learning habits, biographical and experiential background, and interests (Renkl, 2009). Ideally, learners decide for themselves what, how, where, when, for what purpose, and above all what they learn.

Svinicki (1999) and Jarvis (2010) warn against excessive demands in constructivist approaches, however. Not everyone is able to cope with the high demands of self-construction or instruction-poor frameworks, particularly lower achievers with less developed cognitive abilities as.

2.2 Formal Learning

Common to all learning approaches is the relatively coherent formal learning. Formal learning takes place predominantly in educational institutions such as schools, universities, or training and further education centers (Overwien, 2005). Formal learning is characterized by its highly regimented and goal-oriented process of knowledge transfer. Learning content is transformed by taking over the material to be learned from teachers to students. This process is integrated into a formal setting,

usually takes place in explicitly designated spaces, is guided, evaluated, and usually certified. Purposefulness and goal orientation are the essential characteristics of formal learning (Lecat et al., 2020; Rodriguez-Gomez et al., 2020).

The focus of formal learning is the teaching of defined learning content and learning objectives. This is done in a systematic and organized manner that targets a concrete learning outcome and consistently aligns the learning process to it. The learning objectives and learning content are clearly identifiable, and the learning outcome can be verified. Formal learning takes place in a structured and institutionally secured framework and is oriented to didactic-methodical criteria (Marsick & Watkins, 2001). The learning situation is largely determined by a professionally trained person who interacts with the learners in a pedagogical manner. Accordingly, formal learning is predominantly externally controlled and has an obligatory character. This learning is mainly cognitive in nature, with the knowledge acquired generally being job-oriented.

In general, formal learning includes the key elements summarized by Rohs (2020):

- Theoretical knowledge
- Teaching of specified learning content
- Concrete learning outcome
- Structured, institutionalized, systematic framework
- Pedagogical instruction
- Extraneous learning
- Cognitive knowledge transfer
- Job-oriented specialized knowledge

Following the argument of Stern and Sommerlad (1999), formal learning is characterized by:

- The learning intention of the learner and thus conscious learning
- The organized and structured mediation of fixed learning content and learning objectives (external control)
- The didactic-methodical guidance of the learning process (offers character)
- The institutional connection of the learning
- The acquisition of (largely) theoretical knowledge

Accordingly, formal learning is regarded as a strict transfer of knowledge in a highly standardized setting, generally classroom-based and certificated (Betts & Rosemann, 2022).

However, these characteristics of formal learning as distinct from informal learning do not always exist to the same extent; accordingly, they shape the learning process differently. While the characteristics of formal learning are very evident in school-based learning, they are less evident in distance learning, for example (Betts & Rosemann, 2022). Here, *institutionalized* learning is largely self-directed. Work-based forms of learning strive for a combination of formal and informal learning and can therefore be classified neither as formal nor as informal. However, the tighter the structural and organizational requirements for the learning process, the more likely it is to be considered formal learning. Still, if they are small and allow individual, largely self-directed examination of the learning object, more possibilities for informal learning open up. This means that informal learning is not completely excluded from formal learning contexts, but that work-integrated forms of learning can also be highly formalized due to the operational design of the framework conditions, even if an "educational institution" as such does not exist. This means that the institutional character is increasingly less important for learning within the company-based vocational training framework. This is not surprising against the background of an initially largely school-oriented discussion (Rogers, 2014).

2.3 Non-formal Learning

Non-formal learning usually takes place in settings comparable to formal learning (Rosemann, 2022). The learning content is transferred in an explicit, clearly structured way with goal-oriented processes. The difference between formal and non-formal learning is the non-certification of learning achievements or educational activity in the latter. Non-formal learning activities have a higher degree of awareness and structure as well.

Overwien (2000) refers to a system of non-formal learning "in terms of learning objectives, learning duration and learning materials," thus emphasizing the target orientation of learning. With the introduction of non-formal learning, the discourse became increasingly complicated, however. According to the European Commission (2020), the embedding of non-formal learning in planned activities that are not explicitly focused on learning is a significant frame of reference for the differentiation of forms of learning. Another distinguishing criterion is the way in which the learning is certified. Various contributions indicate that non-formal learning usually does not lead to a formal qualification (Eraut & Hirsch, 2007; Pylväs et al., 2022; Rogers, 2014; Simon & Ruijters, 2004).

Non-formal learning activities, such as short-term continuing and information events, also include informal learning activities so that in most cases, a combination of non-formal, reactive, deliberative (intentional), and implicit workplace learning takes place (Eraut, 2004, 2014). In implicit

learning, there are no conscious intentions to learn, whereas reactive learning involves short and mostly spontaneous periods of reflection on past and future learning opportunities. Implicit learning activities also address questions to other persons and observe or self-induce the consequences of different actions. These forms of learning can be further differentiated into intentional and unconscious learning activities. Deliberative learning (intentional learning) takes place both through intentional learning activities and explanatory approaches in informal and non-formal learning contexts, as well as complex tasks in the work process where learning is a by-product (Rogers, 2014).

Eraut (2000, 2004) states that non-formal learning depends on the activity and task space, different learning impulses exist. In this context, the main effects conducive to learning are participation in group activities, cooperation with other people, coping with challenging tasks in the activity, and working with customers. Eraut (2000, 2004, 2014) further distinguishes between the following forms of learning:

- Work processes with learning as a by-product
- Learning activities embedded in work and learning processes
- Learning activities at or next to the workplace

The assignment of non-formal learning situations takes place depending on the consciousness of learning, that is, whether the learning activity or the execution of work is the primary focus. Work processes with learning as a by-product include problem solving and participation in group processes, as well as advisory activities. Among the learning activities embedded in the work and learning processes, Eraut (2014) lists questioning and learning from errors (Leicher et al., 2013), as well as the individual's ability to reflect (Wang et al., 2022).

2.4 Informal Learning

Informal learning refers to all learning activities that are not explicit, institutionalized, or certified. It usually takes place in the learner's present context, be it a private situation or the workplace. Therefore, informal learning is characterized through negation forms. It is not institutionalized, not certified, not bound to a setting, and not determined by a clear student-teacher role distribution. Moreover, informal learning can be intentional, unintentional, or incidental (Cerasoli et al., 2018).

Many scholars have examined the field of informal learning activities, granting it different characteristics. Dehnbostel (2015) gives one breakdown that differentiates informal learning into the following three concepts:

- Explicit learning: conscious learning, focused on actions
- Implicit learning: unconscious, mostly unreflective learning, focusing on the action performed
- Reflexive learning: experiences that are consciously processed and embedded in new action patterns and strategies

Most base work on informal learning began in the late 1990s and continued into the 2000s. The term *informal learning* showed great differences, but for a comprehensive overview of this concept, it is useful to describe its facets in all dimensions (Mulder et al., 2009). These facets are subdivided into the following four main areas.

Intention (Livingstone, 2001; Eraut, 2004)

The intention that learners have with their informal learning action is the first differentiation. According to Eraut (2004), processes can be explicit or implicit. Implicit learning takes place unintentionally, similar to the considerations of Marsick and Watkins (2001) in which incidental learning occurs without direct learning intention. Explicit learning can be further divided into reactive and deliberative. With reactive learning, deliberate and spontaneous action occurs directly in response to an event. With deliberative learning, the learning action is planned in the long term, with consideration of the needs to address and which actions are necessary for realization.

Type of Learning Activity (e.g., Tikkanen, 2002)

Tikkanen (2002) distinguishes between cognitive and physical learning activities. Cognitive learning activities are thinking actions that precede the physical activity and integrate knowledge into pre-existing structures or acquire knowledge from new domains. Piaget (1985) and Vygotsky (1981) show that when a cognitive conflict occurs, a person is forced by reflection to rethink scripts, integrate new concepts, and match existing forms of knowledge with current influence.

Physical activities, meanwhile, are visible actions, purely observable behavior, that follow cognitive conflict under certain circumstances (Tikkanen, 2002). Cognitive and physical learning activities can occur in parallel; according to Marsick and Watkins (2001), they are not mutually

exclusive. Rather, in addition to their singular occurrence, they can constitute a set of learning activities that are mutually dependent and build upon each other.

Social Learning (Felstead et al., 2005; Lave & Wenger, 1991)

Learning in informal contexts occurs either individually or within social associations. Thinking, reading, and researching databases represent individual acts of learning. Socially shared constructs are found especially in approaches involving communities of practice (Lave & Wenger, 1991). Both Doornbos et al. (2008) and Shuck and Herd (2012) emphasize the importance of the social component, especially in interactive learning activities.

In addition to individual factors, contextual factors play an equally important role in informal learning. In contrast to Bauer and Gruber (2007), contextual factors focus on the learning environment itself as a determinant of which contents are learned and how. Factors that hinder learning, such as poor access to resources, or those that promote learning, such as distinct and familiar communication channels, characterize the learning context (Decius et al., 2021; Jordan, 2014).

In summary, informal learning is a learning process that is integrated into individuals' lives and actions (Crans et al., 2022). This learning is characterized by intention, type of learning activity, social forms of learning, and learning context. Informal learning is a process that changes the spectrum of knowledge, thus creating new contents, integrating new ideas into existing structures, or revising existing knowledge. Knowledge itself is acquired through the execution of learning activities, as examined in more detail below.

The informal learning actions occurring in informal learning contexts are meant to solve a problem. In the process of conceptualization, scholars have provided different classifications. In their model, for instance, Felstead et al. (2005) differentiate learning as acquisition and learning as participation. Under the first, they subsume attended trainings, courses, a focus on skills acquired through learning, use of skills, and idiosyncrasies not directly acquired in the work context; reading books, manuals, user guides, and work-related literature fall under this domain. Under the second domain, learning as participation, fall regular settings, doing regular work, having others exemplify certain work steps, reflecting on work performance, looking at and listening to others as they do their work, and trial and error. This breakdown's clear distinguishing of its two classifications demonstrates that a general definition of learning actions does not cover the necessary range of activities.

Livingstone (2001) offers more general, uncategorized considerations, revealing 11 of the most frequently mentioned informal learning activities in the studies reviewed:

- Keeping up with the latest job and career developments
- New tasks in the job
- Problem-solving skills and soft skills
- Workplace-related learning on the PC
- Job-related health and safety knowledge
- New technologies and equipment
- Employee rights and responsibilities
- Supervision and management skills
- Job-related literacy and numeracy skills
- Job-related foreign language skills
- Other job-related informal learning

These informal learning activities are highly knowledge-oriented, focusing on acquiring knowledge relevant to the workplace. Lohman (2009) lists further reflections on informal learning to expand the repertoire established by Livingstone (2001):

- Browsing the internet
- Having conversations with others
- Sharing materials and sources with others
- Collaborating with others
- Thinking about your own actions
- Trial and error
- Browsing subject-specific magazines and journals
- Observing others

Lohman (2009) shows that predominantly observable behaviors form informal learning activities, though Eraut (2004) presents an even more specified breakdown and systematizes the learning actions that occur. These considerations are presented in table 1.

Table 1 Concept of learning actions (Eraut, 2004)

Timeframe	Implicit Learning	Reactive Learning	Deliberate Learning
Past episode	Indirect connection of past memories with present experience	Brief timely, spontaneous reflection on past events, incidents, and experiences	Discussion and review of past actions, conversations, events, and experiences
Current episode	A selection of experiences built into episodic memory	Take notes on facts, ideas, opinions, and impressions Ask questions Observe the effects of the action	Engage in the decision-making process, problem solving, and planned informal learning
Future behavior	Unknown expectations	Identify potential future learning opportunities	Plan learning opportunities Rehearse future events

Per Eraut (2004), both cognitive aspects and the means of acting are considered in learning actions, starting with reactive actions and ending with planned and/or socially agreed-upon actions. Nevertheless, this model does not consider all possible facets: individual, social, and collective factors can be added for expansion. Accordingly, Simons and Ruijters (2004) distinguish learning activities into processes or events that take place individually or collectively.

To summarize these broader concepts of learning, informal learning is defined as learning from experience that can be planned or unplanned and that is not formally structured or intuitively organized (Marsick & Volpe, 1999). Learning that is organized in an educational institute and conducted to achieve certification can be described as formal learning (Marsick & Watkins, 1990; Rogers, 2014). Informal learning, meanwhile, is not situated in classrooms, is mostly unstructured, and is more likely to be controlled by the learner (Kyndt et al., 2018). Furthermore, it does not lead to certification (Jeong et al., 2018).

For a further distinction of learning activities, it is necessary to review the structuring dimensions. The dimensions of learning activities are intention (Eraut, 2000), setting (Marsick & Watkins, 2018), and type (Hirschmann & Mulder, 2018; Simons & Ruijters, 2004).

Intention

Eraut (2000) distinguishes between "deliberative learning," which is planned and conscious; "reactive learning," which is comparable to a spontaneous reaction; and "implicit learning," which is unconscious and mostly unrecognized by the learner (p. 115).

Setting

The second learning dimension is setting, which includes the kinds of interaction that take place during learning activities. Notably, Individual learning activities are carried out without social interaction, while social learning activities are carried out together with other individuals, either one-way (asking for help) or mutual (discussing something and learning from each other). However, individual learning activities can occur individually (e.g., reflecting on a theme when alone) or with other people (e.g., reflecting on a problem while attending a meeting). Social learning activities occur only in socially shared situations (e.g., discussing a problem with colleagues). Apart from the presence or absence of others (i.e., working individually or in a group), setting implies that the learner thinks solitarily about a problem (individual) or reflects about something others have said (social). Cognitive and physical learning activities can both be informal, whereas physical learning activities are overt and can be triggered by cognitive learning activities.

Type of Learning Activity

Learning can be seen as a process in which knowledge is created by transforming experiences (Kolb, 1984; Kolb & Kolb, 2018). This can involve mental or cognitive activities, as well as physical learning activities that are observable (Mulder & Ellinger, 2013). Simons and Ruijters (2004) make a distinction between cognitive processes and physical learning activities. Their distinctions on in dividual and collective learning process is presented in table 2.

Table 2 Individual and collective learning processes (Simons & Ruijters, 2004)

		Product	
		Individual	Collective
Process	Individual	Individual learning	Individual learning with a collective product
	Collective	Learning in a social interaction	Collective learning

Simons and Ruijters (2004) also regard learning as both an implicit and explicit mental and/or overt activity or process whereby changes are brought about in the knowledge, skills, attitudes, or learning capacity of individuals, groups, and organizations.

Their distinction has formed the fundamental basis of learning activities over the last few decades. These highly influential research and theoretical concepts relate to learning in and for the workplace and are widely regarded as the current terms of learning. Hence, they are the basis for research on facilitators of and barriers to learning.

2.5 Facilitators of Learning

After outlining the context of learning and activities that occur in it, this section sheds light on the factors that play a role in the selection, evaluation, initiation, and retention of learning activities, starting with an overview of general contextual, organizational, and individual-related influencing factors.

The claims of the different definitions of learning often oppose each other. Whyte (2002) describes the conflicts of interest that develop from these intersections in her characterization of the workplace in the 21st century (DiBenedetto, 2019). According to this characterization, paradoxical opposing positions are both hallmarks and drivers. Learning in the workplace is characterized by competition as well as collaboration, by selfishness in actions as well as altruism. Moreover, it is the pleasure in and of the work contrasted with a work strategy requiring as little effort as possible. Finally, it is the discrepancy between the value that people have for a company and their actual salary. These opposing positions reflect the dynamics that shape the workplace, people, culture, company history, work climate, work processes, and nature of the premises (Down, 2006).

Individual and contextual factors not only condition learning in the workplace but are also characteristic of the workplace itself. Seen in this light, individual factors; employees‘ views, perceptions, and willingness to perform; and organizational structures, resources, and regulations form organization. Neither contextual factors (Ellinger, 2005) nor individual ones (Kwakman, 2003) alone characterize place, with research on the influences of workplace learning showing a balance between these factors (Berg & Chyung, 2008; Skule, 2004; Van Woerkom et al., 2002). In an analysis of importance, however, individual factors are decisive (Berg & Chyung, 2008). One reason for this may be the belief that an organization provides the framework, but individuals fill in and change it (Segers et al., 2021). For their part, frameworks stem from individuals’ deliberations. Bauer and

Gruber (2007) argue that the basic features of the learning environment (i.e., the workplace) develop at both the micro and macro levels, but are nonetheless of individual origin.

Despite this range of influences on the workplace and thus on learning conditions, a number of factors promote learning itself. Skule (2004) and Ellinger (2005) mention predominantly contextual factors, while Eraut (2004) and Van Woerkom et al. (2002) name general factors. Table 3 summarizes these and other factors.

Table 3 Factors that promote learning (own presentation)

Representative Work	Promotors of Learning
Skule (2004)	• High readiness for change • High willingness to respond to requests and needs • Management accountability • Intensive contact with experts • Feedback from superiors • Management support in learning issues • Efficiency reward system
Van Woerkom et al. (2002)	• Balanced workload • Variety • Autonomy • Participation in work groups • Cooperation with colleagues and superiors • Communication with colleagues and superiors • Coaching • Positive organizational learning climate
Eraut (2000, 2004)	• Challenge • Value of work • Support from colleagues and superiors • Division of work • Working relationships with colleagues and supervisors • Sufficient variety in work assignments • Participation in work groups • Possibility to consult internal and external experts • Alternating positions that stimulate learning on the job

Representative Work	Promotors of Learning
Nyhan (2006)	• Variety and control over one's own work • Work assignments that require new technologies to encourage personal development • Opportunity to receive constructive feedback from supervisors and colleagues • Time to think about work assignments that involve thoughtfulness and choice • Opportunity for employees to help shape the learning environment • Attractive training and development programs • Participation in problem-solving processes
Ellinger (2005)	• Leadership and management connected to learning • Internal company culture connected to learning • Tools, techniques, and resources that facilitate learning • People who establish learning networks

In summary, workplace, contextual, and individual factors influence learning activities to promote learning. Across all the approaches shown, it is varied, challenging, and supportive work in which individuals regulate large parts of the solution process that is conducive to learning. Support from superiors and colleagues as well as organizational culture have a contextually supportive effect on learning. When investigating learning activities at the workplace, these factors must be taken into account in a first step toward the detection of barriers to learning at the workplace.

3 Where Learning Takes Place in German VET

This chapter reviews where learning takes place in the German VET system with a focus on VET professionals. This covers a first attempt to reflect on conditions for professional development, a short overview of the German VET domain and trainers/consultants, and an introduction to the concept of workplace learning. To research barriers to learning, it is necessary to take a close look at where learning actually takes place in the VET workplace.

3.1 Conditions for Reflexive Professional Action

Professional growth is a process by which trainers or educators increase their capabilities and credentials (Fernández, 2013). It can be established in the workplace through CPD (Collin et al., 2012; Sandal, 2021), which can be viewed on an individual, organizational, systematic, or political level (Billett et al., 2008; Tynjälä, 2022). Professional growth is based on the demands of the environment, the organization, and political or structural elements (Merriam, 2018).

Since VET professionals‘ professional development and CPD are often informal and based on their experiences, it is necessary to keep a close eye on the real-world challenges and problems professionals face in their daily work routines (Dymock & Tyler, 2018). Against this background, the demand to further the professionalization of VET personnel is not new (see, e.g., Brünner, 2014; Diettrich, 2017), nor does it come as a surprise in view of recent research on the situation of in-company training staff (e.g., Bahl, 2018; Di Maio, 2021; Klein et al., 2020; Solga et al., 2014).

In between the pressure of these circumstances is the importance of training pedagogical personnel for the VET challenges in a digitalized workplace (Billett, 2022). For this purpose, creating a combination of skills relying on expertise and practice in area-specific prerequisites is particularly important for regular job operations and accomplishments (Andersson & Köpsén, 2019; Baumert & Kunter, 2013; DiBenedetto, 2019). Therefore, the European Union has outlined three distinct levels of professionalism as essential for qualified trainers, counselors, and trainers:

- Vocational competencies
- Pedagogical and social competencies
- Management competencies

Accompanying the renaissance of learning in work (Dochy et al., 2021; Goller et al., 2022; Harteis et al., 2022) is a series of empirical studies referring to the workplace as a place of learning. Within

the German context, Franke and Kleinschmidt (1987) set the tone with their work on "the workplace as a place of learning" and shaped further extensive theoretical and empirical work (e.g., Dehnbostel, 2015, 2022). Their study highlights the importance of the workplace as a place where learning occurs in various dimensions, types, and settings.

At work, learning spaces extend and deepen learning or, on the basis of work, integrate learning by enriching informal, non-formal, and formal learning (Dehnbostel, 2022). They structurally extend work infrastructure, create a spatial-organizational context, and, in some cases, specifically pursue e-learning, situational learning, or organizational learning. These are not pedagogical spaces, but learning spaces (Dochy & Wybo, 2021). Therefore, rather than spaces that are conducive to learning and competencies, which are designed under the primacy of operationality and action requirements, they bring work and learning together. The reciprocal relationship between work and work environments (Tynjälä, 2013, 2022), or the interrelationships of competence development and structure, increasingly shape work processes and conditions in the digital world of work, as well as generate work-related learning spaces. These learning spaces are increasingly necessary for digital work processes and self-directed and self-determined work and learning. Modern work concepts such as semi-autonomous group works, agile teamwork, online communities, and collaborative working and learning open up such learning spaces. Indeed, they shape the structure of work, but are also shaped by it (Goller & Paloniemi, 2022).

In addition, Dehnbostel (2020) and Diettrich et al. (2021) postulate a framework of conditions for reflexive professional action: shaping corporate learning, consequences of digitalization, and new forms of work for corporate training personnel.

Recognizing the union of work and knowledge, Billett (2022) challenges deficient perspectives of informal learning at the workplace, instead suggesting that learning comes from engaging in similar social activities (Pylväs et al., 2022). Such learning does not originate from persons alone, but rather is a consequence of customs that have stemmed from historic, cultural, and circumstantial foundations in addition to how individuals emotionally and mentally link to these proceedings. These elements form activities, communication, and how people learn through them.

To suggest the potency of practical workplace experiences, Billett (2014) puts forward that acquiring knowledge through experience goes beyond connecting theory and practice. The researcher instead proposes that learning is formed by socio-personal aspects as one appropriates and adjusts what they have encountered in unique social and material conditions to construct and increase their knowledge. However, educational processes and the resultant professional growth are unavoidably and instinctively activated by individuals' liaison with their habitat (Ashton, 2004; Cseh et al., 1999). For this reason, Eraut (2000, 2004) postulates that rather than contemplating job

site learning as either formal or informal, it should be contemplated as unplanned, involving varied tiers of purpose to gain knowledge. Contrarily, according to Billett (2014), one can see all learning opportunities as intentional since they are meant to ensure the continuity of social and professional doings. Based on these assumptions, Dean and Sykes (2021) argue that professional growth in the workplace includes multiple levels of intentions within both formal and informal practices. These works can all form a solid framework for professionals in the VET system, especially the German VET system, as well as for workplace learning.

3.2 The Professional Domain in the VET System

The professional domain in the VET system is regarded as heterogenous and can hardly be characterized by short definitions (Diettrich, 2017; Wolff, 2023). Therefore, *vocational education and training* and *vocational education and training system* are to be understood here in the broadest sense as the totality of school- and non-school-based institutionalized qualification or competence development for the employment system below the university level (Harm, 2021; Harm & Neumann, 2020).

The extremely heterogeneous group of professional people similarly allows for hardly any reliable findings. In the area of training, these individuals include:

- the in-company trainers and skilled workers providing training,
- training personnel in inter-company training centers,
- teaching staff at vocational schools,
- personnel involved in the measures of the so-called transition system, and
- pedagogues, support and remedial teachers, or career entry guides, among others (Diettrich, 2017; Kohl et al., 2021).

In continuing education, staff act in various capacities as trainers, coaches, lecturers, supervisors, personnel developers, or education managers (Harm, 2021; Harm & Neumann, 2020). Often, training and teaching staff also perform duties on the examination boards of relevant bodies.

The recognition that qualification potentials or vocational training systems have not emerged as simple reactions to a need for specifically trained employees, but from a highly complex social process as integrative arrangements in national work cultures that presuppose behavioral patterns solidified over generations (Gitter, 2022). Regarding the VET system in Germany, it is highly dedicated to the system of dual vocational training. There are professional qualification

requirements for full-time and part-time trainers as well as training specialists (Vocational Training Act, BBiG, 2020, §30). Accordingly, anyone who possesses professional, vocational, and occupational pedagogical knowledge is professionally suited for training. Vocational skills, abilities, and knowledge are demonstrated by corresponding vocational qualifications or relevant final examinations at German universities, as well as an "appropriate period" of practical work experience (Barabasch et al., 2021). For the vocational and occupational pedagogical side, this is only regulated to the extent that the Federal Ministry of Education and Research (BMBF) can, under certain conditions, determine whether and in what way these skills, knowledge, and abilities must be proven (cf. BBiG, 2020, §30).

The quality of the in-company component of dual—and the accompanying training and practice—courses depend very much on how these courses are designed in terms of pedagogy and didactics (Antera, 2021). Even though no statistics are available, it can be assumed that cooperating company dual courses are often, perhaps even usually, led by instructors who are otherwise or simultaneously responsible for non-academic dual vocational training—and who themselves do not have an academic degree (Wolf, 2023). As a result of the exceptional situation caused by COVID-19 that has persisted since March 2020, the outstanding importance of educational staff and their qualifications and professionalization in organizing, designing, and accompanying teaching-learning processes and supporting learners has become much clearer (Deutscher & Winter, 2022; Zutavern & Seifried, 2022). In this knowledge and learning society with its unstable, complex, and ambiguous future, the professional pedagogical actions of company training personnel have a significant influence on individual and professional development (Wisshak & Hochholdinger, 2020).

The assumption of tasks in the context of dual study programs is currently changing at high speed due to digitally supported learning and work (Spöttl, 2021). A process-oriented organization of work, the automation of work steps, and the loss of sensory perceptibility of work processes due to their relocation into the digital space require and enable innovations in corporate learning (Gerholz & Gössling, 2022). In this context, digitalization is a twofold challenge for educational personnel: First, new work content, structures, processes, and thus digital learning objects emerge from a technical content perspective. Second, digital media supports corporate learning far more extensively than was the case just a few years ago (Gensicke et al., 2020; Wolf, 2023), which certainly also applies to dual courses of study. New learning formats or curricular units are emerging, ranging in scope from simple learning to elaborate Massive Open Online Courses (MOOCs). Thus, digitalization implies challenges and tasks on the professional-content and pedagogical-didactic level (Cattaneo et al., 2022; Seufert & Scheffler, 2018).

The status and freedom of action for company training personnel play a role in these tasks' manageability and in developing pedagogical and didactic action structures in both company training processes and organizational tasks (Sloane et al., 2018; Wolf, 2023). Digital transformation as an object of vocational training processes and in methodological and organizational vocational learning design requires higher training personnel competencies. Most German trainers already have a Trainer Aptitude Ordinance (AEVO) level, though this is seen more as a training authorization and is less likely to ensure the sufficient development of work-related competencies (Ulmer, 2019). Indeed, various studies regard the AEVO as a training authorization that cannot ensure sufficient trainer didactic-pedagogical preparation (e.g., Bahl & Brünner, 2013; Gitter, 2022; Gössling & Sloane, 2013; Rauner & Lehberger, 2022; Ulmer, 2019).

When there is an absence of specialized personnel and youths are altering their educational preferences, tutors can be crucial for improving the quality of the vocational training system (cf. Dittrich et al., 2021; Kohl et al., 2021). Up until now, vocational training staff have not been properly prepared for these difficult, sometimes varied and convoluted tasks; instead, they have discovered approaches to manage the issues and design solutions in a wide collection of informal means usually based on their experience (Clarke et al., 2021; Grollmann & Ulmer, 2020; Wolf, 2023). As a result, the need for credentials due to the computerization of goods, procedures, services, and company models; instructional potential to address current issues such as training dropout, multiplicity, and inclusivity; and exploiting digital channels for education have raised the need to develop staff proficiency.

Bonnes et al. (2019) describe the various aspects of trainers' professional competences within the international training literature, covering the following aspects:

- Knowledge of psychology and education
- Learning in general and adult learning in particular, such as teaching principles, training transfer, motivation, and emotions
- Content knowledge of and professional experience in the relevant field
- Knowledge and skills for the planning and structuring of training
- Knowledge and skills for needs assessment and evaluation
- Knowledge and skills for managing groups, especially with respect to communication, building relationships, conflict management, and trainee orientation
- Knowledge and skills for the use and variation of different teaching methods and technologies

- Trainers' personal and motivational attributes and attitudes, such as approaches to teaching, enthusiasm, self-perception, self-confidence, expressiveness, charisma, and commitment

This considerable demand is often met by either regional, institution-, or industry-specific qualifications or by individual, relatively general, and typically uniform national offerings (Vogelsang et al., 2022; Zutavern & Seifried, 2022). To meet the high demands placed on initial and continuing VET personnel and to strengthen and professionalize them, Germany has already issued two nationally standardized training regulations for Certified Initial and Continuing Training Educator (level 6 of the German Credential Framework, or DQR) and Certified Vocational Educator (DQR-7) with the reinstatement of the German Ordinance on Trainer Aptitude (AEVO), but they have not fulfilled their expected boost to professionalization (Schuster & Margarian, 2021). Since their nationwide regulation in 2009 (Li & Pilz, 2021), VET degrees have not been able to establish themselves across the board either: they have hardly any graduates, are largely unknown on the market, and are little accepted by employers, as a recent evaluation of the advanced training degree "Certified Vocational Teacher" shows (Schley et al., 2020). Overall, there is a lack of systematic and permeable qualification paths and thus also an insufficient basis for professionalization processes (Elbers et al., 2021). At DQR levels below 6, there is currently no vocational pedagogical qualification that ensures a continuous development path from the AEVO to the vocational pedagogue Chamber of Commerce and Industry (IHK), and thus to connectivity between existing competencies across all sectors.

In the domain of German VET professionals, scholars have discussed various national approaches in recent years (Diettrich et al., 2021; Rauner & Lehberger, 2022; Vogelsang et al., 2022). Among them, Dehnbostel's (2015, 2022) approaches seem to combine the most recent CPD and considerations on workplace learning developments, as well as major learning theories (Segers et al., 2021; Tynjälä, 2013, 2022) and learning activities for VET and learning at the workplace. Specifically, Dehnbostel (2022) shapes corporate learning contexts by type (formal, reflexive, or implicit), outcome (theoretical and experiential knowledge), and context, whereby professional action competence can be achieved through a combination of different forms of learning. One characteristic of this approach is its strong orientation toward learning environment (Dehnbostel, 2015).

According to Cunningham and Dawes (2016), in work-based learning settings, the learning location and workplace are identical (e.g., group learning activities in the work process, learning islands). However, work learning is characterized by a stronger separation of the workplace from the place of learning, with learning place implying a simultaneous spatial and work-organizational

connection between these two contexts (e.g., group learning activities, quality circles). One form of work-oriented learning is learning characterized by a spatial separation between the place of learning and the workplace (e.g., learning factories; Billett, 2022; Dehnbostel, 2015; Faßhauer et al., 2021). Accordingly, work-integrated learning activities can be purely informal during work or in non-formal learning contexts. Through the introduction of new work and organizational concepts, various forms of work-integrated learning organizations have been established, such as "communities of practice, online communication, e-learning forms, learning islands, work and learning tasks and coaching forms" (Dehnbostel, 2018). Characteristic features of these forms are structural connections of learning and work infrastructure (Segers et al., 2021). Workplace learning infrastructures are in turn characterized by various learning opportunities such as digital media, learning support, and work-related learning concepts.

Work-based forms of learning are subject to the reality of work, where the success of the learning process depends on the work tasks, workplace equipment, and corporate culture (Dehnbostel, 2018). This learning method aims to determine the appropriateness of the learning process and allows learners to acquire of knowledge and skills by observing and imitating work processes through helpful explanations from experienced employees.

Rosemann (2022) sets in close relation the framework of corporate learning (betiebliches Lernen) based on the conceptions of Bronfenbrenner (1981) and Dehnbostel (2015). Within this framework, the micro level comprises the activities and relationships of the individuum (Bronfenbrenner, 1981). These are guided by individual-level person, educational, and occupational characteristics. Person-related characteristics are subject to little or no change, whereas educational and occupational characteristics are acquired over the course of a lifetime and can be changed through one's own actions (Tynjälä, 2022).

Next, the meso level is characterized by interrelationships between different areas of life in which the individual is directly involved (Bronfenbrenner, 1981; Rausch, 2011). In this context, the employment- and activity-related characteristics of the business environment are of particular importance. At the meso level, the design of education and training programs, is characterized by clearly defined goals, structures, and regulations (Seufert & Schuchmann, 2013).

Informal meso-level social networks, which are the counterpart of institutions, usually expand over time due to casual and longer-term meetings (Bronfenbrenner, 2012). In turn, the macro level influences individuals indirectly, as they are not directly involved in it, but are guided by macro-level events (Bronfenbrenner, 1981).

Operational learning arises in the immediate life world of the individual (micro level) but can be influenced to varying degrees by the meso and macro levels, which is why a multi-perspective approach is required when considering the supportiveness of the learning environment (Froehlich & Bohle Carbonell, 2022; Van Waes & Hytönen, 2022).

3.3 The Concept of Workplace Learning

Learning at work is regarded as the key source for learning in the 21st century (DiBenedetto, 2019; Harteis, 2022). Referring to Billett et al. (2022), there is a wide range of ongoing challenges within workplace learning that need to be addressed in research and conceptional works.

These may cover:

- understanding and making explicit the complex and vast knowledge required for professional practice and identifying ways in which this knowledge can best be learned and developed throughout professional life
- analytical explications of processes that support learning at the individual and organizational level
- understanding how learning experiences and educational processes might best be aligned or integrated to support professional learning

At the workplace, ongoing professional staff progression is of utmost importance (Pylväs et al., 2022). Already in the 1990s, Marsick and Watkins (1990) and Argyris and Schön (1996) drew attention to the workplace as a setting for expanding knowledge. Argyris & Schön's (1996) actions for progression in the labor setting are divided into knowing during action, sensibly recognizing the next step, and reflecting in action, which includes deliberation about further activities. Marsick and Watkins (2015) generally differentiate these actions into two main forms of training that take place at the workplace: informal and casual learning. From this idea, an abundance of additional models has been identified that are classified into workplace learning (Billett, 1995) and job-associated learning (Streumer & Kho, 2006). According to Billett (1995), work-based education follows a specific pattern.

Of particular note is Eraut and Hirsh's (2007) fundamental two-triangle model, which describes factors that affect learning at work. Examining training in initial occupations from a sociocultural viewpoint, Eraut and Hirsh (2007) convey office education as swayed by a few contextual, capacity, execution, and formal/informal learning components. They contend that informal learning for tyros

is generally a derivative of daily work measures and is thus not ordinarily seen as "learning" by students.

Eraut (2008) also exhibits a typology of preparation comprising three profession activities: task measures where learning is a consequence of performing work (e.g., cooperating with other people, problem solving, liaising with clients); learning accomplishments situated inside work (e.g., querying, reflecting, knowing erroneously); and learning systems that are more formal chances to focus on learning (e.g., mentorship, conferences, incessant courses). Eraut (2008) further contends that this typology can enhance employees' cognizance of accessible the curricula of learning in the workplace while concurrently delivering information on how to gain access to these studying prospects.

Tynjälä (2022) highlights the importance of work experience in structuring the required activities for workplace actions. The instruction activities are neither formal, secondary, informal, nor spontaneously overseen. Contrarily, they are dictated by the needs of the workplace. The distinct and contextual variables that govern workplace learning thus act as determinants of workplace learning. As per Doornbos et al. (2008), work-associated learning is affected by three elements: procedure, educational atmosphere, and result of the process. Work-related knowledge is an essential experience led by premeditated learning objectives, with learning itself an intellectual and analytical practice that happens in an atmosphere with an established structure (Streumer & Kho, 2006).

Jacobs and Park (2009) summarize the divergent processes of workplace learning in their concept of learning cells. Learning events (cells) may occur independently or together in the workplace or in situations associated with it. Each of these cells reflects experiences and learning actions that may emerge in the work context under certain conditions. Table 4 shows how many different processes can occur during informal learning activities. They are divided into on-the-job and off-the-job categories; the actions listed can also occur in parallel and with or without support.

Table 4 Processes in workplace learning (Jacobs & Park, 2009)

Learning Cell	Possible Learning Outcome
Off the job/unstructured/passive	Study trip
Learning does not occur in a work context without the help of a construct or limited involvement of a trainer or supporter	Paid educational trip
	Professional escort

Learning Cell	Possible Learning Outcome
Off the job/unstructured/active Learning does not occur in the work context without the help of a construct but with the direct involvement of a trainer or supporter	—
Off the job/structured/passive Learning does not occur in the work context with the help of a construct or the limited involvement of a trainer or supporter	Self-directed learning
Off the job/structured/active Learning does not occur in the work context with the help of a construct and with direct involvement of a trainer or supporter	Internet-based training Group-based classroom learning Blended training
Off the job/structured/active Learning does not occur in the work context with the help of a construct or the direct involvement of a trainer or supporter	Normal coaching Ad hoc consulting Job mirroring Learning during action Communities of practice Reflection in action
On the job/unstructured/active Learning occurs in the work context without the help of a construct but with the direct involvement of a trainer or supporter	Unstructured training at work
On the job/structured/passive Learning occurs in the work context with a construct and the limited involvement of a trainer or supporter	Learning during the action
On the job/structured/active Learning occurs in the work context with the help of a construct and the direct involvement of a trainer or supporter	Structured training at work Formal counseling Formal coaching

This list of learning cells also shows the extent to which informal learning in particular is linked to learning at the workplace and which learning activities or models can come into play at that time.

Learning at the workplace can thus be interpreted as learning for the workplace: the actions initiated all serve to improve skills that may be necessary to perform the job.

In summary, learning takes place both on and off the job (Hager, 2019), thereby linking learning content to the requirements of the job. Informal learning on the job, according to Hager (2019), is mainly contextual and work- and experience-based, stemming from situations in which learning was not the main goal. This situation is usually initiated by the learning environment itself or the individuals rather than by teachers or trainers and is often socially shared. Learning actions and concepts of workplace learning outline the practical framework in which informal learning can take place. Eraut and Hirsh (2007) adapt these ideas and concepts to frame the key aspects of workplace learning. Shaping workplace learning on organizational, team and individual level. Looking at the individual level, these factors can be described as:

- The capabilities an individual has in the broadest terms, including personal attributes, skills, knowledge, experience, and understanding.
- Individuals' performance at work and how this is perceived by others and themselves.
- The formal and informal learning that takes place for individuals and the processes by which this happens (this learning is not necessarily planned or conscious).
- The context in which individuals work and learn, which includes both the job and its wider context, especially workplace culture, social interactions, and more formal management processes.

These factors always affect each other. Capability is obviously influenced by learning, but it also influences ability to learn; its relationship with job performance behaves in much the same way. The context in which individuals work and learn influences how their capabilities are perceived, how they perform, and how they learn. Further, an individual can be highly effective in one setting and not another. As such, individuals have a dynamic relationship with their work setting, being both influenced by it and being part of it themselves and through their relationship with others.

Cseh et al. (1999) postulate a model of work and the work context in which formal and informal learning take place. The model's outer circle comprises the learning context, which is determined by personal, social, professional, and cultural framework conditions. Every learning process is triggered by an external or internal stimulus (trigger). Individuals interpret and evaluate surprising experiences or problems before testing alternative solutions for managing the problem in a further step (Rosemann, 2022). The interpretation of the possible is influenced by respective contexts, such as family members or colleagues at work, a process equally necessary to develop suitable solutions

and weigh whether additional resources are needed to solve the problem. If individuals require a further course of action, the evaluation of the goal's achievement and the derivation of possible consequences allows them to draw conclusions for future action (Marsick & Watkins, 2015). Cseh et al. (1999) also stress the importance of the context in which especially informal learning takes place. It is the pair of glasses through which individuals analyze and interpret experiences, choose alternative solutions, try them out, reflect on the consequences, and plan new experiences (Segers et al., 2021).

Workplace learning has been an integral part of research since the early 1990s. Agyris and Schön (1990) and Billett (1995) in the international field as well as, for example, Dohmen (2001) and Straka (2004) in the national field have had a lasting impact on its research developments and concepts. Billett (2022) assumes that workplace learning follows a structure based on work experiences to organize the activities required to act on the job. In this context, learning activities are not linear, formal, random, unstructured, or spontaneous. On the contrary, they are determined by the requirements of the workplace. Thus, the individual and contextual factors that condition workplace learning also function as its determinants. In turn, Doornbos et al. (2008) divide work-related learning into three components: process, learning environment, and process outcome. In this way, work-related learning is a predominantly explicit process guided by predefined learning goals. Learning itself is also understood as a cognitive and rational process that takes place in an environment with a specific structure (Smet et al., 2022), with knowledge access guided and controlled by authorities. The result of this process is primarily an individual increase in knowledge and skills.

Biggs's (1997) 3-P model, adapted by Tynjälä (2013), encompasses many different approaches to combine the demands of a digitalizing world and can be used as a basic framework for workplace learning. Here, the workplace is embedded in a sociocultural environment and divided into pre-stage, process, and product. The pre-stage is characterized by factors related to the learner or learners (Hilkenmeier et al., 2021), such as learning motivation or prior knowledge, and by the learning context, including organizational structure or management support. Underlying assumptions or self-concepts shape the process of workplace learning, during which informal, formal, or non-formal learning activities take place (Segers et al., 2021) by performing the work itself, reflecting, or tackling new challenges and tasks (Tynjälä, 2013, 2022). Finally, the product takes form in the learning outcome, such as actual task performance or improved workflow. This explicitly includes digital learning processes as workspaces (Harteis, 2022).

This chapter provided an in-depth review of learning at the workplace and where it happens in the German VET system. It discussed several approaches and perspectives of workplace learning

from the past decades, as to understand where barriers to learning at the workplace occur and which fostering or hindering factors can arise, it is necessary to investigate the setting where learning takes place at the workplace.

4 Barriers to Learning

This chapter describes barriers to learning in detail. The chapter introduces both fostering and inhibiting factors to learning in general and in the workplace, with a focus on the interplay between the individual learner, the team, and the organization. Individual factors like motivational approaches, fears, health issues, and cognitive restrictions are not the highlight of this research, unlike most of the literature on workplaces and professional development.

4.1 General Barriers to Learning

The 2000s saw the identification of a multitude of barriers to formal and informal learning in or for the workplace (Hicks et al., 2007). Many works refer to the early publications of Billet (1995), Eraut (2000), as well as to Marsick and Watkins (1990). Hicks et al. (2007) in particular highlight several single barriers to workplace learning, including:

- Lack of access to authentic task activities
- Lack of expert guidance
- Reluctant experts
- Opaque knowledge, or knowledge required of new learners that can be difficult to access and understand
- Instructional technology limitations
- Lack of time
- Increased multi-tasking
- Use of new technologies
- Lack of proximity to learning resources
- Lack of meaningful rewards for learning
- Limited or lost autonomy in organizational affairs
- Motivation to learn that decreased when training expectations were not met
- Difficulty getting time off to attend training sessions

As stated in section 2.5, there are many facilitating factors to workplace learning. In their work, these authors mainly point out that the opposite of theoretical- or research-based assumptions leads to hindering factors, or barriers (e.g. Ellinger, 2005; Skule 2004). Throughout the 1990s and early 2000s, these conceptions were widely used, though they do not follow a consistent strategy; they more likely work as a list of items that might have a hindering effect. Certain environmental

considerations not only control training in the workplace but are also hallmarks of the office itself, such as staff members' attitudes, their awareness and keenness to achieve, and authority frameworks and their capitals and rules. Neither environmental (Ellinger, 2005) nor private factors (Kwakman, 2003) govern the environment independently, though studies on the effects of workplace learning demonstrate an equilibrium in the consideration of these factors (Berg & Chyung, 2008; Skule, 2004; Van Woerkom et al., 2002). Individual elements are most significant, however (Berg & Chyung, 2008). One purpose for this may be that a business supplies the building, but persons enter and alter it.

Regardless of these implications for the workplace (and thus for teaching conditions), numerous components can hinder learning, predominantly situational factors, as mentioned by Skule (2004) and Ellinger (2005), though Eraut (2004) and Van Woerkom et al. (2002) note general aspects as well. Table 5 names the factors that hinder learning from these early studies.

Table 5 Factors that hinder learning (own presentation)

Representative Work	Factors that Hinder Learning
Skule (2004)	• Low willingness to change • Low willingness to respond to requests and needs • No management accountability • Little contact with experts • Hardly any support from management for learning issues • No reward system
Van Woerkom et al. (2002)	• Irregular workload • Monotony • External determination • Hardly any participation in work groups • Hardly any cooperation with colleagues and superiors • Hardly any communication with colleagues and superiors • Hardly any coaching • Negative organizational learning climate
Eraut (2000, 2004)	• Hardly any challenges • Low-value intern work • Poor working relationships with colleagues and supervisors • Little variety in work tasks • Hardly any participation in working groups • Hardly any possibility to consult internal or external experts

Representative Work	Factors that Hinder Learning
Nyhan (2006)	• Work monotony and heteronomy • Hardly any work tasks that promote personal development • Hardly any opportunities to receive constructive feedback from supervisors and co-workers • Little time to think about work tasks that involve thoughtfulness and choice • Little opportunity for employees to help shape the learning environment • Unattractive training and development programs • Little involvement in problem-solving processes
Ellinger (2005)	• Leadership/management that is not committed to learning • Internal company culture of entitlement and permissions that is slow to change • Work tools, techniques, and/or resources that make learning difficult • Structural barriers • Lack of time due to work pressures and responsibilities • Too many changes in too short a time • No learning from learning

In summary, early studies view learning barriers as the opposite of identified facilitators of learning in professional work settings. These reflections might be appealing on the first look, but they also indicate a diminished understanding of the complexness of barriers. This becomes obvious when considering barriers more holistically at the individual, team, and organizational levels. Studies (Kyndt et al., 2018; Shuck, 2019) have demonstrated that it is principally multifarious, tantalizing, and encouraging work in which employees have control of a major portion of the problem resolution procedure, which is evaluated as advantageous to learning. Direction from bosses and co-workers alongside a learning-accommodating organizational culture can be of contextually advantageous value as well. In evaluating learning endeavors at work, these elements must be taken into account.

On the organizational level, various research approaches view barriers as a category of their own instead of as the counterparts of facilitating factors (Barrett, 2021; Matzdorf et al., 2000; Schilling & Kluge, 2009). In a first attempt to categorize barriers on the organizational level, Matzdorf et al.

(2000) identifies obstacles that hinder individual learning in an organizational context. This comprises obstacles like competition, misleading understanding of professionalism, monetary factors, lack of interest in learning, and bad prior training experiences. These obstacles obstruct surveyors' cognitive strategies, looking to the future, discovery of novel methods of tackling difficulties and queries, recognizing more distinctly what opportunities the industry is bringing forward, and approaching and managing purchasers, among other effects. Most of these blocks are not lone occasions but transpire jointly in a circumstantial situation, engendering (and themselves engendered by) a corporate atmosphere or civilization.

Embedding parts of these results, Schilling and Kluge (2009) postulate a scheme that could identify potential barrier hotspots on the organizational level. These potential barriers could occur on the individual, team, or organizational level. These are:

- Barriers and obstacles to intuiting
- Barriers and obstacles to interpreting
- Barriers and obstacles to integrating
- Barriers and obstacles to institutionalizing

In a systematic review, Schilling and Kluge (2009) detect many of these barriers to organizational learning. In addition, Barrett (2021) identifies barriers to learning within an organization that the learner can encounter in a new learning process within the workplace. These mostly individual barriers are lack of creative space, middle management buy-in, organizational priorities, lack of trust, maintaining status quo, and a failure-free zone. Others are personal characteristics like lack of time, commitment, and motivation, which interfere with general willingness to learn.

The discussed approaches all identify serious threats to learning in an organizational context on the individual, team, and organizational level. Nevertheless, these approaches are not holistic and lack a valid research instrument.

4.2 Novel Approach to Barriers to Learning

To create a holistic approach to barriers to learning, more contextual and individual factors have to be combined with existing theories and research. Therefor it is necessary to review possible engagements in learning before considering barriers to learning. Shuck and Herd (2012) identify three stages of engagement in learning actions: cognitive engagement, emotional engagement, and behavioral engagement. In cognitive engagement, learners develop an idea of whether their

activity is significant, can be classified as safe (physically, emotionally, and psychologically), and if there are appropriate resources (tangible and intangible) to complete the activity. This process forms a cognitive intention assessment (Shuck, 2019) and places value on specific situations. It is important to note that for learners, this is only a snapshot in time; if the parameters change, a new assessment of the situation is made. The crucial guiding principle of this interpretation is the question of whether an action, a volitional act, makes a difference (i.e., "does it matter?"; Kahn, 2010). Kahn (2010) indicates that employees express themselves and initiate actions when they feel they can make a difference, change directions in projects, add value to the current process, or participate in something greater than themselves (de Vreede et al., 2019).

The second level of engagement in learning actions is emotional engagement, which develops out of employees' desire to contribute their personal resources. This is based on the emotional bond that arises when employees have made the decision to engage cognitively at a very personal level and are willing to contribute a part of themselves to the learning action. In the best case, they even identify emotionally with the current task. The contributed resources include tangible and intangible goods such as time, participation, commitment, concern, intellectual ability, extra work, pride, personal attribution, and belief. Employees who can identify with their organization also have a sense of belonging, a feeling reinforced as attribution to increase involvement in organizational processes (Rhoades et al., 2001). Research suggests that emotionally engaged employees are more productive, less often absent, and contribute to reduced turnover rates (Czarnowsky, 2008; Puhakka et al., 2021; Wagner & Harter, 2006).

Behavioral engagement shifts an action to the outside world in the third engagement stage. Behavioral engagement is the visible or overt response to a positive cognitive appraisal (e.g., cognitive initiating) and a willingness to invest one's own resources. It is understood as the physical determination of emotional and cognitive admission. Thus, behavioral engagement is what is visibly evident in an employee. Engaged employees bring themselves and all their abilities fully to bear in the work. In addition, this is the basis for overtime, role modeling, enlightened civic behavior in the interest of the company, and employee retention (Macey & Schneider, 2008). This thesis focuses on this behavioral stage of engagement in learning actions and the specific barriers that prevent it.

While many studies have addressed the constant need for lifelong learning (Aspin & Chapman, 2000; González-Pérez & Ramírez-Montoya, 2022), engagement in learning activities does not emerge from itself. Participation and engagement in learning depend on the results of cognitive, emotional, and behavioral engagement evaluations in learning activities themselves (Ehlers, 2022; Shuck & Herd, 2012), which are determined by external and internal barriers, as well as fitting

problems. The results of non-engagement in learning activities can lead to limited daily work tasks or long-term unachievable targets (Shuck, 2019). Based on these considerations (especially Schilling & Kluge, 2009; Shuck & Herd, 2012), a novel model of barriers to learning was developed in the current study. This model combines the affordances of the workplace and barriers on the individual, team, and organizational level. In addition, it takes the three different types of barriers (internal, external, and organizational fit) into account, referring as well to learning environment and learning types (formal, non-formal, and informal) to fully assess the complexity of German VET professionals' workplaces.

Barriers to learning at work constitute a medley of absent integral, collective, and corporate facets. These influences delay learning, disturb or interrupt learning activities, pause action, or finish instruction operations earlier than intended (Crouse et al., 2011). Current tools that gauge barriers are oriented typically at the organizational level (Allen & Heredia, 2021; Eken et al., 2020; Kezar & Holcombe, 2020). Upon detecting these barriers, vigorously scrutinized elements and teaching circumstances require further attention to amplify learning outcomes and conquer these learning obstacles (e.g., Cerasoli et al., 2018; Jeong et al., 2018; Kyndt et al., 2018).

Decius et al. (2021) note inspecting personal character and the knowledge atmosphere in an organization as significant for analyzing learning. The barriers to such learning can be external, interior, or associated with organizational fit; they can also affect persons, teams, or the company at large. External barriers may take the form of authoritative proficiency (Jordan, 2014) or bounded powers (Billett & Choy, 2013), while other studies show additional barriers such as motivational aspects (Nouwen et al., 2021), social relations (Mishra, 2020), the overall construct and appurtenances of the job site (Barrett, 2021; Schilling & Kluge, 2009), and further career growth (Ilmari et al., 2021).

Possibilities for external barriers' betterment could involve increasing resources, optimizing the work climate, or offering more chances to learn. Meanwhile, individual barriers may arise, for example, in how individuals' inclinations affect the manner, location, extent, and reason learning exercises are attempted or neglected. Fitting problems are predominantly external physical, psychological, or emotional impediments to work tasks (Papacharalampous & Papadimitriou, 2021; Wagner & Harter, 2006; Wollard, 2011). These are seen as a split between scholastic and everyday work. Accordingly, fitting issues can be the negative effects of barriers happening in an organizational system. An illustration of a fitting issue is when employees do not conform to standardized organizational rules because they view the standards as inefficient or not fitting with their own working predilections. The outcomes of not taking part in learning exercises can prompt

restricted everyday duties or difficulty reaching lasting objectives (Papacharalampous & Papadimitriou, 2021).

Regarding the design of research on barriers to learning, Belling et al. (2004) and Crouse et al.'s (2011) approaches are most prominent and therefore presented in more detail. In their study on learning and transfer to learning within organizations, Belling et al. (2004) review quantitative research settings with a focus on managers, learners' individual characteristics, and workplace conditions and facilities. The main questionnaire measurement tool consisted of 26 items on perceived barriers and 17 items on facilitators linked to the transfer of learning, featuring topics such as "pressure to give priority to 'bottom line,' short-term, financial targets." The questionnaire referred to a number of common barriers such as lack of support (especially managerial support); missing criteria for a clear organizational structure and hierarchy; the mechanism of workplace curricular and hidden agendas; and pressure to work with limited resources and knowledge.

Belling et al. (2004) carried out a quantitative study to investigate the learning and transfer of learning within businesses, analyzing managers' personal characteristics, work surroundings, and solutions. The research uncovered 26 barriers and 17 facilitators in relation to the transfer of information. The quantitative questionnaire gathered data on commonly encountered obstacles such as lack of aid (particularly managerial help), the deficiency of organizational beliefs, curricula and hidden plans in the workplace, and the stress of functioning with minimal resources and knowledge. Consequently, the study measured such elements as "Pressure to give priority to 'bottom line,' short-term, financial targets," "Lack of resources to implement new ideas/plans from the program," and "Too many changes in the workforce." Deficiencies in resources to execute fresh designs/schemes from the program or numerous pauses in the workforce were also included. The instrument measured items on a 7-point Likert scale from 1 (*extremely promotional*) to 7 (*extremely obstructive*), starting with the query, "Does this position assist or impede your acquisition of information?"

Meanwhile, Crouse et al. (2011) conducted a qualitative study to examine obstacles to learning in the workplace. The researchers noted 46 probable barriers and investigated strategies for instruction, obstructions, boosters, and probable outputs from educational endeavors. This uncovered 9 problem classifications (resource limitations, inadequate access, engineering limitations, individual hindrances, social limitations, structural and social hindrances, course/learning substance and conveyance, intensity connections, and change). The problems

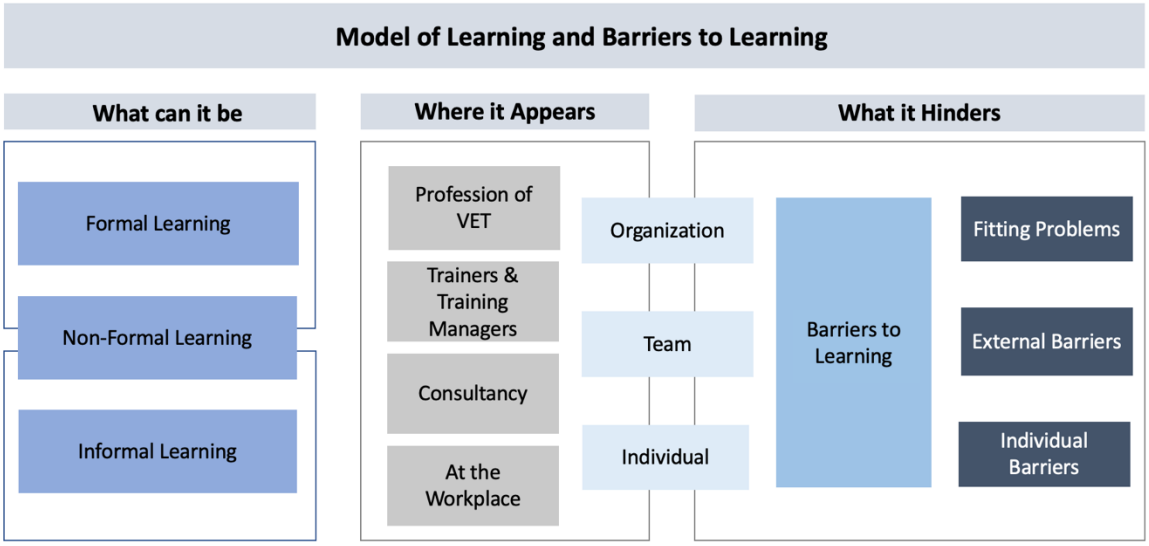
themselves included no headship vow to learning (structural and social hindrances), doubtful/opposing learning (individual hindrances), and powerless authoritative authority (intensity connections).

Facilitators and barriers to learning can be adversaries (Cerasoli et al., 2018), such as when a new stimulus in the work environment is seen as a promoter and the current stimulus as a barrier to learning activities (Keck Frei et al., 2021; Louws et al., 2017). This suggests that facilitators and barriers are not universally applicable, but instead reliant on individual or group thoughts and suppositions. What obstructs one assembly of students could help another, for example, such as time pressure or accessibility to specific assets in a business educational setting. Learning barriers raise the question of what is not working and should be changed, such as inadequate correspondence, unfavorable work environment, or low employee independence (Brion, 2021; Decius et al., 2021; Kim et al., 2021). This is an important consideration given the multifaceted nature of barriers to learning in the work environment.

To successfully explore learning barriers in the workplace, the investigation must incorporate distinct facets of knowledge-intensive service work, necessitate multiple requirements, and present the capacity to address issues in many ways. Hence, study is indispensable to governing the multiple calls to address predicaments in this sector (Dymock & Tyler, 2018).

The new model proposed in this thesis starts with what learning can be (i.e., formal, non-formal, or informal). In the next step, the model reveals where learning can happen in the professional context, covering the different aspects of VET, consultancy, and the general concepts of workplace learning; consequently, learning can appear on the organizational, team, and individual levels. These levels foster learning actions as well as barriers to learning. There are also three stages of barriers: internal, referring to learners themselves; external, referring to interpersonal settings or team-related issues; and organizational fit, referring to barriers withing the organizational structure that alienate learners from the organization or its goals. Figure 1 gives an overview of the described model.

Figure 1 Model of learning and barriers to learning (own presentation)



Research reveals that hierarchical barriers may emerge on the individual, team, and organizational levels. Inspirational elements (Nouwen et al., 2022), social liaisons (e.g., Mishra, 2020), the workplace‘s structure and tools (Billett, 2022; Goller & Paloniemi, 2022), and further career growth (Schiller & Kluge, 2009) may all act as hierarchical barriers to learning and be external, internal, or connected to organizational fit (Johnson et al., 2018; Nel & Linde, 2019).

This chapter revealed an in-depth review of barriers to organizational learning, including hindering factors identified by extant research. It then focused on a broader concept by reviewing various approaches to barriers to learning, which were integrated into an emerging model of barriers to learning at work, that is, the theoretical foundation of this thesis.

5 Aim of the Thesis and Overview of the Studies

This thesis has four aims, to be answered with the model of learning and barriers to learning shown in section 4.2:

- First, complex learning conditions in the workplace can be identified comprehensively rather than exclusively.
- Second, the barriers to learning that are experienced in daily work situations can be traced.
- Identified barriers can be used to develop a framework and even a questionnaire to detect both formal and informal barriers at the workplace.
- Fourth, this questionnaire can be used to design holistic learning environments for vocational education and training (VET) and training professionals.

To understand the workplace as a complex learning environment for individuals, teams, and organizations, all these levels have to be understood and addressed (Hager, 2019).

Although existing research in the field of workplace learning, training, and VET professionals refers to learning as a key source of professional development and performing highly demanding tasks, barriers to learning in combination with actual learning conditions at work have been a blind spot in the latest studies. Therefore, further research on barriers to learning at the workplace is crucial. Learning is essential to managing the multiple demands and challenges at the workplace in this domain (Dymock & Tyler, 2018), to which interruptions, limitations, or barriers can be a serious threat. As such, a measurement tool in particular that can detect and categorize barriers to learning at the workplace is missing.

This thesis addresses these shortcomings. To acquire knowledge about where learning takes place in VET and what barriers to learning at the workplace may occur, the overarching aim of this thesis is to gain insight on the superordinate question, what are barriers to learning and how can they be measured? To achieve this aim, the following four research questions will be answered:

1) What challenges and problems do VET professionals face in their professional development? (Study I)
2) What are professional trainers and training managers' learning conditions and informal and formal learning activities? (Study II)
3) What are the experienced barriers to learning, and how can they be categorized? (Study II)
4) How can barriers to learning in the workplace be categorized and measured? (Study III)

5.1 Research Approach

Aim 1 Identifying Challenges and Problems to VET Professionals' Professional Development

Though lately there is a growing interest in VET professionals, studies often do not consider the challenges and problems related to their professional learning development. VET professionals cope with many challenging work-related circumstances on the personal, team, and organizational levels, especially concerning potential learning settings and professional development. Therefore, a research approach (Study I) was designed to identify the challenges and problems that VET professionals face in their learning environments.

Aim 2 Identifying and Describing the Learning Conditions and Informal and Formal Learning Activities of Professional Trainers and Training Managers

Though there are ground-breaking works on learning conditions in general, the domain of professional trainers and training managers is widely underrepresented in this research. These individuals work in many intricate and challenging circumstances, so they rely on constant education and specialist advancement to maintain a compulsory expertise level and stay informed of new improvements. VET professionals' duties are exceptionally difficult, complex, and various, as well as count on the reception of students, the formation of trainings, training requirement assessments, and bookkeeping. In this way, learning is indispensable to supervising the various obligations and difficulties at work in these spaces. Therefore, this thesis's second aim is to unveil how professional trainers and training managers describe their workplace learning conditions and the informal and formal learning activities they intend to accomplish, as realized in Study II.

Aim 3 Identifying and Categorizing Barriers to Learning

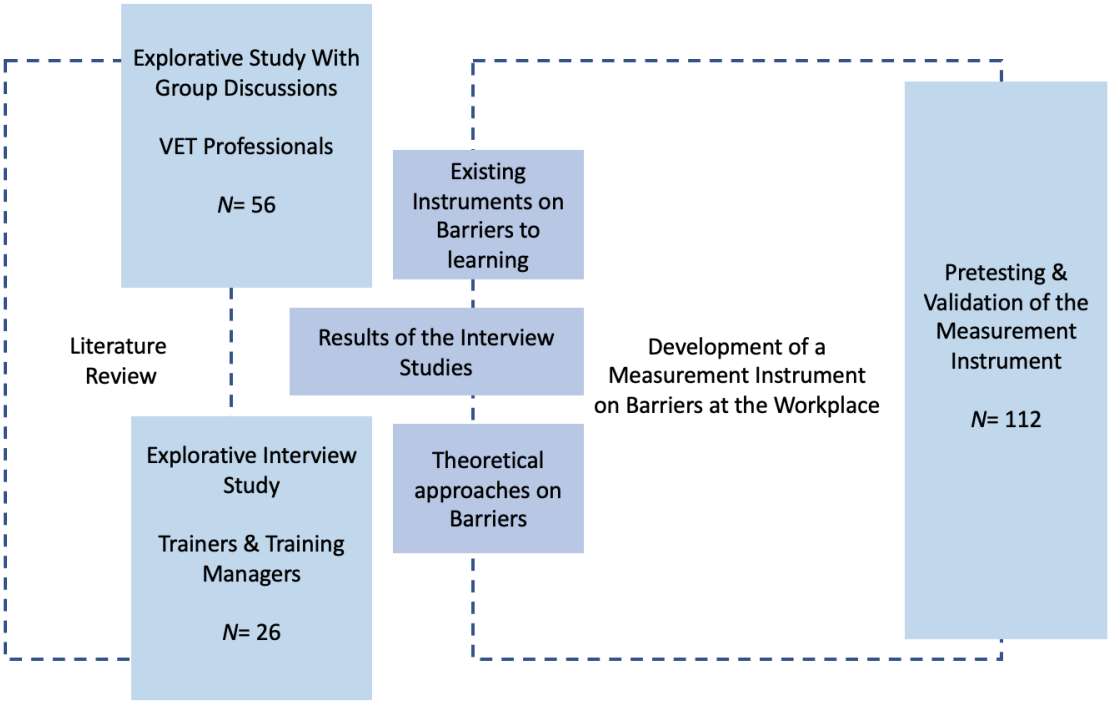
In the workplace, barriers to learning can be individual, team-based, or organizational-based and interfere with the fulfilment or fully end of learning activities. Similarly, barriers can present a question of what is not doing well and ought to be changed, such as miscommunication, inadequate workspace, or deficient autonomy. This is only visible when considering the complexity of barriers in the work environment. The third aim is therefore to identify and categorize barriers to learning at the workplace (Study II).

Aim 4 Categorizing and Measuring Barriers to Learning at the Workplace

Though research addresses facilitating and hindering factors on theoretical (Shuck & Herd, 2012) or fundamental bases (Belling et al., 2004; Crouse et al., 2011), an actual measure of barriers to learning is missing. Following the results of previous research approaches, this fourth aim is to develop and validate an instrument that measures barriers to informal and formal learning in the workplace (Study III).

In line with the model of learning and barriers to learning introduced in section 4.2, a multi-disciplinary research approach was developed to answer the thesis's research questions and accomplish its aims. Building on in-depth studies on learning, professional development, VET, workplace learning, and the facilitating and hindering factors of learning, the two explorative studies, Study I and Study II were designed. The first involved VET professionals (*N* = 56), and the second one concerned trainers and training managers (*N* = 26). The first study was additionally validated by German VET experts (*N* = 10). Both studies revealed insights on the workplace problems and challenges of VET professionals, general work settings, learning activities, and barriers to learning. These results were used to develop an instrument to measure barriers to learning in the workplace. This instrument was then tested and validated with trainers and consultants (*N* = 112). Figure 2 gives a visualized account of the research design.

Figure 2 Multi-disciplinary approach (own presentation)



This multi-disciplinary approach revealed first-hand insights on barriers to learning on the individual, team, and organizational levels. In addition, the developed measurement allowed the detection of barriers and possible consequences to learning at the workplace. The following section gives an overview of the three studies.

5.2 Overview of Studies

To achieve the aims of this thesis, three studies in structural relationship were conducted. Following the superordinate research question, four research question were set, which the three studies aim to address and answer accordingly.

Study I

This first study investigated what challenges and problems German VET professionals face in their professional development. This research was completed at the national scale and had two components: (A) an exploratory survey composed of group discussions (*N* = 53 members in 6 groups) and (B) a validation of the outcomes with German VET specialists (*N* = 10). The gathered material was registered, transcribed, and studied through qualitative content evaluation. With the aid of a concept-centered categorization, the talks generated 12 individual and system-level reports deemed relevant by the 10 VET professionals. In the end, several VET experts looked for visible commendation of their undertakings or individual efforts in their pedagogical and corporate-economic roles. These discoveries demonstrate a major need for VET expert preparation and instructional openings. Mostly, there is a demand for advanced verified schemes concerning topics such as action and capacity orientation; practicality and transition centers; particular and structural reconsiderations; media capacity; and educational backing in all structures and at every level.

Study II

The aim of the second study was to unveil how professional trainers and training managers describe the learning conditions of their workplaces, what informal and formal learning activities they intend to accomplish, and what barriers to learning at work they encounter.

Barriers to learning at the workplace can be attributable to individual, team, or company features that impede the commencement of or disrupt effective learning; cause procrastination; or

suspend work tasks before their expected completion. This qualitative analysis attempted to explore this issue by examining the viewpoints of 16 trainers and 10 training managers. The participants judged their labor as highly complicated, with an equal measure of novel and taxing assignments, along with daily tasks. Their formal and informal educational actions were also essential to maintaining high efficiency. The trainers apprised a broad variety of circumstances in which they had problems with learning in their jobs; the greater part of them pinpointed external barriers to knowledge, such as unspecific guidance from superiors. The conclusions of this study signify the difficulty of VET labor, which occasions learning stimuli through conditions where trainers can commit to learning activities.

Study III

The aim of this final study was to develop and validate an instrument that measures barriers to informal and formal learning at the workplace. Based on the previous two studies and an in-depth analysis of barriers to learning in the recent literature, this study saw the identification and clustering of challenges and barriers to develop a novel measuring instrument of barriers to informal and formal learning.

The designed instrument consists of five elements with questions about barriers on the individual and organizational/structural levels; technical boundaries; transformation; and doubt. To confirm the instrument, a single sampling questionnaire with 112 consultants and self-employed people was conducted. The authentication incorporated exploratory factor analysis, interior consistency evaluation, confirming factor analysis, and convergent validity appraisement. The results led to a three-level barrier scale for formal education and a two-level barrier scale for informal learning; both had Cronbach's alpha values between .80 and .86. These developed and confirmed scales are intended to provide knowledge on elements that discourage individuals from learning in the workplace and demonstrate organizations' capacity for change.

These three studies were published as articles in different international double-blind, peer-reviewed journals that maintain the highest research standards. These articles' results are presented in chapters 6–8.

6 Study I: Input from the Grassroots Level — Reflecting Challenges and Problems for VET Professionals in Germany[1]

[1] This chapter is based on:

Anselmann, S., Harm, S., & Faßhauer, U. (2022). Input from the grassroots level — Reflecting challenges and problems for VET professionals in Germany. *International Journal for Research in Vocational Education and Training (IJRVET)*, *9*(2), 239–268. https://doi.org/10.13152/IJRVET.9.2.5

7 Study II: Trainers' workplace characteristics, informal and formal learning, and barriers to learning[2]

[2] This chapter is based on:

Anselmann, S. (2022). Trainers' learning conditions, informal and formal learning and barriers to learning. *Journal of Workplace Learning, 34*(8), 742–764. https://doi.org/10.1108/JWL-11-2021-0152

8 Study III: Learning barriers at the workplace: Development and validation of a measurement instrument[3]

[3] This chapter is based on:

Anselmann, S. (2022). Learning barriers at the workplace: Development and validation of a measurement instrument. *Frontiers in Education*, *7*, 880778. https://doi.org/10.3389/feduc.2022.880778

9 General Discussion and Reflection

This chapter presents and reflects on the general findings of the three studies. The overarching aim of this thesis was to gain insights into what barriers for learning are and how they can be measured.

Based on the general research question, what are barriers to learning and how can they be measured, four subordinate research questions were formulated and answered. These research questions were:

1) What challenges and problems do VET professionals face in their professional development? (Study I)
2) What are professional trainers and training managers' learning conditions and informal and formal learning activities? (Study II)
3) What are the experienced barriers to learning, and how can they be categorized? (Study II)
4) How can barriers to learning at the workplace be categorized and measured? (Study III)

Section 9.1 outlines the key findings of each study, and section 9.2 draws conclusion to the research questions. Section 9.3 discusses the potential limitations, followed by a brief summary of the implications for practice in section 9.4 and for future research in section 9.5.

9.1 Key Findings

Study I

This research entailed a comprehensive overview of the difficulties and challenges that German VET practitioners endure in learning activities and their identified potential remedies. The study used a nationwide research procedure of workshop discussion teams (*N* = 53 participants across 6 groups), VET experts (*N*= 10) validating the results. The conclusions of this study revealed a strong need for suitable qualifications and education alternatives for VET experts, primarily for trends that are freshly proven, such as action- and capability-concentrated efforts, practical and operational reflection, media proficiency, and learning help in all forms and at all stages.

In the workshops, the participants emphatically declared that notwithstanding the need for more formal training, most VET trainers, teachers, and tutors should be able to take advantage of below-level, same-level, and above-level AEVO courses and sessions. In addition, the delegates shared that attendees at upcoming training sessions need accessible programs that are formal, well-structured, available outside of emergency situations, and that result in credentialization

outside the AEVO. Many VET trainers, coaches, and educators sought perceivable approval of their activities or personal devotion to pedagogical and corporate-economic roles. In addition, the participants frequently requested a mix of field-specific material with vocational educational components known as a professional proficiency method for instruction in a particular field.

This study also established that a multitude of singular desires as well as distinct predicaments arouse separate certification obligations. However, the complicated web in which training personnel work also requires specialized qualifications (collaboration in the learning vicinity, partnership with IT suppliers, cooperation with specialized education and exceptional needs educators, etc.). The following hypotheses were subsequently interpreted from the investigation stage and fed the discourse:

- VET educators, mentors, and teachers' professions are either one-way avenues or dead ends.
- Extra duties, especially within simultaneous studies, reinforce a shift in characterizations of the profession, bringing about augmented pedagogical expertise.
- The birth of a layered authorization process for vocational instruction and added instruction personnel is indispensable. Especially the paucity of qualifications at DQR-5 is severe.
- The usability of program materials should be broadened. However, combined influences with learning roles in skill-based schools do not seem beneficial.

These topics were divided into groups according to each workshop to address the requisite training plans throughout all DQR stages. The VET professionals' and experts' investigations in the processing phase supported extant research (Bahl, 2018; Brünner, 2014; Diettrich, 2017; Ulmer, 2019). Additionally, the present progressions, potential outcomes, and issues confronted by the professionals were distinguished and deliberately and academically consolidated into their training plans. The experts did not just significantly certify this evidence but also reiterated the pertinence of required instructive activities once more.

Study II

The intent of Study II was to disclose the educational circumstances of professional VET trainers and training managers, what informal and formal educational exercises they complete, and what blocks to learning they experience in their everyday work. All discoveries comfortably blended into Tynjälä's (2013) 3-P model to examine the evidence from easy learning to barriers to learning. The results demonstrated that every one of the trainers and managers evaluated their work as profoundly intricate, with a harmony between new testing tasks and scheduling. They likewise

portrayed a wide scope of opportunities to collaborate with colleagues and bosses to share communication strategies, such as different approaches to gatherings, tackling issues, or casual discussion between offices or collaborators.

The trainers and training managers emphasized the relevance of both formal and informal instruction as the most effective tools for staying abreast of lifelong education. Puhakka et al. (2021) and Cerasoli et al. (2018) similarly demonstrate the varied nature of formal and informal schooling exercises in the workplace; the workplace itself also serves as a multifaceted hub for learning (Segers et al., 2021). Within the work environment, this study's participants detailed individual and collectively shared informal learning activities in particular.

Exchanging with colleagues, asking for assessments, or voluntarily conversating are pertinent to Neaman and Marsick's (2018) inquiry on constructing the situation, not only the technology, to assimilate education into work. Likewise, each of the participants took part in formal instructions, postgraduate studies, or accredited IT courses to further their learning. In addition, they accepted the need of continuous training through CPD courses, formal trainings, and work-related learning prospects. On a daily basis, employment circumstances allow diverse openings to gain knowledge (Dymock & Tyler, 2018).

The participants also listed different barriers to learning that they confronted at work (Kyndt et al., 2018; Shuck, 2019; Shuck & Herd, 2012; Syma, 2019). These barriers were internal, external and organizational fit issues that could be designated to the individual, group, or organizational level; barriers inside and outside the workplace interfered with or obstructed the commencement of fruitful learning, postponed operations, or finished learning exercises substantially sooner than arranged. The results revealed inspirational components (Nouwen et al., 2021), social communications (Mishra, 2020), the common structure and apparatus of the work environment (Rosemann, 2022), and further profession improvement (Kraimer et al., 2011) to be external learning barriers. These discoveries accommodate investigations on learning circumstances that accentuate the significance of tending to both barriers and opportunities for learning in the work environment (Brandi & Iannone, 2021). Additionally, this examination suggests other methods to uphold learning-accommodating workspaces.

Learning innovators ought to cut down constraints on individual, group, and organizational extremes. This is possible with deficient applications from organizations, leaders, or learners themselves. Investigations of proficient trainers and training managers' learning conditions in the work environment; informal and formal learning exercises; and barriers to learning offer important findings on the dynamic acquisition of knowledge in the work atmosphere of a particular circle (Goller & Paloniemi, 2022; Harteis, 2022). These results reflected work environment intricacy

particularly as a learning condition that offers inspiration to learn, opportunities to participant in learning, and obstructions to learning. To comprehend the work environment's complex, multifaceted nature, especially concerning barriers to learning, each of these measures needs to be comprehended and tended to (Schilling & Kluge, 2009).

Study III

The aim of this last study was to construct and validate a device to measure barriers to formal and informal learning at the workplace by utilizing the results of the two preceding studies of VET professionals, trainers, and training managers, as well as existing instruments by Belling et al. (2004) and Crouse et al. (2011). The scale was validated by a questionnaire completed by 112 consultancy workers and independent professionals. The results led to the creation of an instrument consisting of a three-element scale measuring barriers to formal learning and a two-element scale measuring obstacles to informal learning. The five total aspects were individual barriers (15 items on commitment and dread), organizational/structural barriers (21 items on pecking order, team atmosphere, and leadership), technical boundaries (5 items on technical conditions), transformation (4 items on turnover aim), and insecurity (5 items on vocation decisions). The Cronbach's alpha values for all factors ranged between .80 and .86.

Table 6 exhibits the findings of a confirmatory factor analysis (CFA). The barriers to formal learning model yielded the following fitness metrics: $\chi 2 = 324.243$, df = 234, $\chi 2/df = 1.06$, CFI = .90, RMSEA = .06, and TLI = .88. As for the barriers to informal learning model, the metrics were $\chi 2 = 210.027$, df = 144, $\chi 2/df = 1.02$, CFI = .92, RMSEA = .065, and TLI = .89.

Table 6 Confirmatory factor analysis of the barriers to learning measurement model (own presentation)

Scale	CFI	RMSEA
Barriers to formal learning		
Individual components (9 items)	.93	.05
Organizational limitations and power relations (11 items)	1.0	.00
Technical limitations (4 items)	1.0	.00
Barriers to informal learning		
Structural components (10 items)	.99	.02
Individual components (10 items)	1.0	.00

According to the CFI values, the model's elements were all related, with Hu and Bentler (1999) suggesting that figures higher than .90 show a strong relationship between factors. RMSEA allowed assessment of the fit indices and stressed the similarity between the model's correlation matrix and that observed in the data. Specifically, the lower the RMSEA figures, the better the numbers fit, with Hu and Bentler (1999) proposing that the RMSEA measurement must be less than .05. Kyriazos's (2018) claims also demonstrate that the model's goodness of fit was considerable, with an RMSEA of .06 for barriers to formal learning and .065 for barriers to informal learning.

The measurement model utilized for barriers to formal learning entailed conventional barriers with the components formal setting (IC_F), company borders and authority associations (OL), and mechanistic restrictions (TL); the model for barriers to informal learning had the components informal setting (IC_IF) and system components (SC).

9.2 Conclusion

The three studies showed that barriers to learning are a severe issue in learning environments and when engaging in challenging situations within vocational education. VET professionals encounter manifold challenges on the individual, team, and organizational levels. When investigating learning conditions, VET trainers and training managers emphasized both formal and informal learning as the most effective methods for staying at the forefront of perpetual learning. Puhakka et al. (2021) and Cerasoli et al. (2018) similarly demonstrate the extensive diversity of formal and particularly informal learning activities at work; the work environment itself is also a complex learning site (Segers et al., 2021). Within the workplace, the study participants detailed individual- and team-level informal teaching actions: for example, conversing with colleagues, seeking opinions, or communicating deliberately or casually. This is associated with Neaman and Marsick's (2018) exploration of consolidating instruction into work by adapting the surroundings, not just engineering solutions to problems. In addition, all the respondents participated in formal trainings, postgraduate studies, or sanctioned IT courses, as well as defended unceasing guidance and courses as obligatory to lifelong learning.

This could incorporate CPD, formal instructions, and work-related knowledge opportunities. Everyday tasks also offer assorted prospects for instruction (Dymock & Tyler, 2018). The participants displayed an array of learning barriers that they felt at their workplace (Kyndt et al., 2018; Shuck, 2019; Shuck & Herd, 2012; Syma, 2019). These obstacles were either internal or external, as well as problems with organizational fit at the individual, team, or organization level. Internal and external barriers interrupted or impeded the activation of productive learning, made

processes sluggish, or concluded learning actions earlier than projected, while organizational fit issues start an alienation between the employee and the organization. The outcomes indicate that inspiring tasks (e.g., Nouwen et al., 2021), social collaborations (e.g., Mishra, 2020), the broad outline and equipment of the workplace (Schilling & Kluge, 2009), and additional career progression (Kraimer et al., 2011) can serve as external learning obstacles in particular. These discoveries are in line with studies on learning settings that emphasize the need to consider both barriers and facilitators of learning in the workplace (e.g., Brandi & Iannone, 2021). Moreover, this examination suggests a novel means of promoting learning-friendly workplaces. This implies that simply conversing about promoting learning facilitators is inadequate to realize them. Learning professionals should also reduce barriers on the individual, group, and organizational levels, which can be achieved with moderate exertion from organizations, directors, or learners themselves.

With regard to the third research question, which concerns issues of external and internal learning barriers in addition to fitting problems, the participants depicted a wide range of circumstances in which they encountered difficulties learning in their work environments. All participants enumerated more than five barriers of all three types. These categories could be allocated to the individual, team, or organizational level; Table 7 records the most common of these. The participants reported more than 200 total external barriers, with 57 on the individual level, 109 on the team level, and 38 on the organizational level. In total, 78 statements concerned internal barriers. For a systematic approach, the internal barriers were also categorized by level, with 46 barriers on the individual level, 20 on the team level, and 12 on the organizational level.

Table 7 Internal and external barriers to learning at the individual, team, and organizational levels (own presentation)

	Internal	External
Individual level	(A) Uncertainty (12/14) (B) Faulty time management (15/18) (C) Lack of motivation to work (8/8) (D) Challenging day (5/6)	(A) Short-dated postponement or cancellation of appointments (8/10) (B) General problems with the company's means of performance (3/4) (C) Other (24/43)

	Internal	External
Team level	(A) Being reserved toward colleagues (14/20)	(A) Disruption from clients or colleagues (21/23) (B) Misleading communication (19/26) (C) Lack of support from supervisor or clients (16/17) (D) Lack of cooperative behavior from clients, colleagues, or partners (14/16) (E) Vague requirements from supervisor or clients (13/14) (F) Missing appraisal from supervisor or clients (10/13)
Organizational level	(A) Being reserved toward organizational strategies and goals (4/4) (B) Other (8/12)	(A) Ineffective IT (20/27) (B) Highly urgent subjects (3/3) (C) Focus on revenue instead of quality or happiness (2/2) (D) Other (5/6)

(N/n) N = number of professionals mentioning the situation; n = number of examples mentioned

(8/11), for example, stands for 8 professionals who mentioned this situation out of the 11 total mentioned examples.

Organizational Fit Problems

Spanning across the individual, team, and organizational levels, organizational fit issues inhibit efficient learning, delay operations, or prematurely terminate the learning process, differentiating them from barriers to learning. Organizational fit problems can relate to internal or external barriers but describe an alienation between the learner and the organization. Mostly starting with the before mentioned barriers and lead step by step from there to mistrust, alienation, resignation and finally if not solved properly in leaving the company. A variety of elements such as the lack of worth or sanction of work, insufficient reinforcement, and unstructured affiliation with associates and customers threaten the way individuals seek out educational experiences (Shuck & Herd, 2012; Wollard, 2011). All participant cohorts, ranging from consultants to education experts, voiced their multiple disputes related to fitting problems on all three levels. Altogether, 21 of the 26 participants

gave their reflections on the various issues. At the individual level, the participants involved reported external fitting troubles that affect their own progression and bring about a feeling of detachment. These quandaries may appear insignificant, but they are actually the beginning of individuals' disaffection with their enterprise or job tasks. Their supposition of how processes should operate or how enterprise regulations should be enforced contrast with the actual activities of their team or business. At the team level, the major fitting issue was unfriendly interactions between associates or superiors. For the organizational level, the participants mentioned general elements within an organization that imply isolation. If fitting troubles are not resolved effectively, they have the most destructive influence of all three learning barriers. As shown in table 8, the participant interviews revealed six degrees of pernicious results of learning barriers.

These six levels start with barriers to learning activities and become more severe. Most of the participants who mentioned growing fit problems stated that it was difficult to keep working on their own, and they often disconnected from their company's goals and values.

Table 8 Negative consequences of learning barriers (own presentation)

Consequence Level	Participant Quote
Level 1 Frustration	"*It would have been so easy. But all the time I started the process, I was interrupted. It was so annoying!"*
Level 2 Reflection	"*Continuous reflection about possible solutions. I clearly have to rethink what could have been done better and what I can do better next time."*
Level 3 Attempt to clarify	"*So I asked my supervisor to be more clear about the requirements. I made a list of possible solutions, which were all rejected*."
Level 4 Work on their own	"*Then I decided to make it my way. I stopped talking to my supervisor about my tasks and managed [them] on my own*."
Level 5 Disconnection from the goals and values of the company	"*It was clear to me: I needed to do it the right way, although this was not the way it was supposed to be [per] my supervisor and the cooperate management."*
Level 6 Dismissal/Termination	"*And then I decided that I have to leave. That's it. There was no support and no personal development."*

In line with the findings from the first two studies, the third study reflected the necessity of measuring barriers to learning at the workplace and yielded an instrument for this purpose. The instrument contained five elements: individual barriers, hierarchical/structural barriers, mechanical barriers, as well as barriers related to change, and vulnerability. This broad scope of barriers to learning was narrowed down to five categories in the derived model: single-handed obstacles, organizational/structural obstructions, technical obstructions, change, and doubtfulness and uncertainty. The outcomes produced a three-factor barrier scale for formal learning and a two-factor barrier scale for informal learning, both authenticated by VET consultants and VET professionals. Both scales had Cronbach's alpha values between .80 and .86. With these developed and validated scales, it is possible to offer insights into factors that hinder individuals from learning at the workplace and show organizations their potential for change.

This model offers an innovative technique to address the significantly convoluted system of barriers to learning in the workplace. Notwithstanding, more research is essential to cast additional insights on the intricate relationship between learning barriers and learning exercises. Barriers at various levels have varied effects on different instructional exercises, for instance, necessitating a better view of these connections, particularly in light of the fact that individuals favor diverse learning situations at work. This underlines that learning barriers form a continuum, so to have an improved comprehension of learning exercises, it is imperative to contemplate barriers and facilitators simultaneously.

Despite the need for additional research, this authenticated instrument can also reveal additional inquiries on barriers to learning in the working environment. It can detect all obstructions to gaining knowledge in the workplace on the individual, staff, and organization levels. Moreover, this measure can recognize numerous other factors such as formal and informal training activities (Brion, 2021), ill-structured leadership (Schmidt, 2008), intense working conditions (Fletcher & Nusbaum, 2010), and the magnitude of digitalization in the workplace (Görs et al., 2022).

9.3 Limitations

Complex research built on several surveys can have certain limitations. To avoid technical or ethical constraints or General Data Protection Regulation (GDPR) related issues, the conducted research underwent an institutional procedure index and received a positive ethical statement, and all three publications that comprise it partook in a multi-round double-blind peer review procedure. Nevertheless, there are limitations that should be addressed specifically within the three studies.

Study I

This first study concentrated on the professional advancement of specifically Germany's VET educators and coaches and the troubles and conceivable resolutions arising from the German VET work environment. Subsequently, this research was based on a potentially ungeneralizable nationwide questionnaire. Despite these local and political factors, this study still discerned struggles and possibilities suitable for VET specialists on a broader scale. The study's limited sample size is also noteworthy. The six national meetings conducted with 53 participants only amount to an initial step for more research projects, though it is common for explorative studies such as this one to have a small sample size (Mayring, 2019). Related, while the workshops were brought to the saturation point and the conducted content analysis indicated no absent information or solutions due to the amount of available data, the exploratory study itself can be a restriction. Still, since there are continually rising new inquiries, an exploratory analysis such as this can provide a very first look at unexamined concepts regarding the professionalization of VET trainers. Additionally, 10 VET specialists verified the results.

Study II

The limitations of Study II can be seen in the multiplicity of circumstances the contributors depicted. Though the participants practice the same job, their workplaces varied. Consequently, 26 conversations with 26 participants were conducted until the saturation point was reached. Qualitative substance evaluation showed no deficiency of knowledge or responses due to lot size, yielding a complete survey within the necessary trait norms and general models for scholastic labor. The assessment's small sample size can be a deficit, however; 26 participants from German-speaking countries and task teams can only be an inception point for future studies. Conversely, the sample size in this exploration is typical to expository research (Mayring, 2019).

This research is further limited by its lack of statistical proof. Primarily, it only gives clues for potential factor connections—the full truth of which must be established quantitatively. Still, the study's validity can be verified despite the popular opinion of uninformed outcomes potentially linking to qualitative examination, conforming to quality standards, having a confidential observer, and merely determining and operationalizing the mentioned queries. Indeed, qualitative interviews provide an adequate technique for creating basic research, exploring distinctive areas, and creating initial discoveries of novel ties.

Examining this matter can present certain boundaries, but fresh fields of investigation are constantly rising, so an exploratory study such as this offers an original understanding of

uninvestigated research areas and pinpoints avenues for additional analysis on interruptions to learning in the workplace. Furthermore, other surveys can assess any consistencies regarding features and obstructions in particularly a non-structured work setting.

Study III

According to Lambriex-Schmitz et al. (2020), every validation study "has several limitations that should be addressed in future research and questionnaire validity testing" (p. 334). Since this study's instrument is based on explorative interviews and can be seen as innovative, comparable instruments are not available. This could pose a limitation to the instrument's convergent validity, so it will be used in a follow-up study in which its validity is analyzed directly. Furthermore, the instrument was tested in the consultancy domain, but it is not limited to this field and should therefore be applied to others with knowledge-intensive service demands (Korster, 2022) or even domains in the blue-collar sector (Decius et al., 2021).

This study may also be hindered by its somewhat restricted sample size of 112 participants. Insufficient statistical power may be one of the ramifications of this small sample size, with Muthén and Muthén (2017) determining that a minimum sample size ought to reach 150 people. Nonetheless, this could be certified depending on the data quality. Particular estimation issues may be much more likely to occur when small sample sizes are clustered in CFA and EFA, correlating with empty slots, low power, and certain consistency assessment values, such as a Cronbach's alpha under .70 (Kyriazos, 2018). In this measurement instrument of barriers to learning, these deficiencies did not manifest in any way.

Regarding validation, the sample was complete with no gaps. There were no estimated values in the entire dataset. The Cronbach's alpha readings were consistently .80 or greater. According to Warrens (2016), such figures are considered satisfactorily good. In addition, Marsh et al. (1998) associate factor and specimen sizes, delineating that large numbers of items for each factor commonly generate reliable conclusions. This anticipates precise and secure parameter evaluations and fewer discrepancy resolutions with solid factors. Marsh et al. (1998) also suggest a sample size higher than 100 to competently prepare CFA or EFA. Although 112 members in validation research is not vast (Cohen et al., 2018), this study yielded adequate results.

The instrument's statistical power and significance could be further proven as well. Study III's exploratory approach could be an obstacle, however, due to the constant emergence of untapped research. Specifically, this kind of investigation can improve awareness of uninvestigated theories and expose possibilities for new examinations to acquire knowledge on barriers to learning in the

workplace. Therefore, future research could determine any regularities concerning traits and barriers particularly in off-record workplaces.

9.4 Practical Implications

This research aims to have valuable implications for both academia and practice, which are now discussed per each study.

Study I

There is a basic agreement that the development, testing, and implementation of systematic internal and external VET and personnel policies are key to the enhancement of VET teaching and training. Equally, they deliver personnel the qualifications they seek and personalized opportunities—and sometimes even careers. As such, an innovative and structured certification system for personnel in training will advance the quality of teaching/learning and extra tuition; promote vocational education; and lead to fuller vocational preparation. Contents and ideas ought to be suitable for the beneficiary group and be able to be completed "prudently." This is also applicable to the clash between significantly important non-public educational organizations and universities, which is currently a hot topic in quality studies (e.g. Schley et al., 2020).

Courses ought to include novel, progressive teaching and learning methods as well (for improved education and corporate deployment) while concurrently staying exact. German specialized VET education necessitates a meticulous, cooperative, and cross-facility addition to existing advanced training careers, modular complementing of the not yet largely present DQR-5, and the progress of links in courses with a soaring universal acceptance of expertly gained proficiency. The aim is an employment pattern that starts with basic VET coaches, trainers, and educators' capabilities as experts, which can continue both seamlessly and interchangeably in advanced certification. This integrates department and audience modular offerings at DQR-5. This continuous for educational possibilities at DQR-6 and up to DQR-7 level.

Additionally, services should incorporate interdisciplinary specialists (trainers and further educators, teaching personnel, training managers, personal trainers) and be interchangeable with university modules (i.e., integration of college components). Moreover, despite all the requirements of formal specialized paths in higher instruction, it was powerfully brought up by the participants that most VET trainers, instructors, and educators must still be able to gain from offers listed below and at AEVO level.

Various stakeholders have emphasized that the field of VET professionals should be furnished with necessary services that are not only provided opportunistically, randomly, and in emergencies but that also involve accrediting qualifications and certificates below university level. VET teachers would also like to be recognized for their diligence, pedagogies, and commercial actions. Additionally, the instructors often asked for a certificate that includes tech-domain skills and vocational teaching. A variety of individual requirements and practical activities induced individual instructive prerequisites as well; however, the diverse structure in which teaching personnel work needs additional qualifications (concords of learning areas, cooperation with tech dealers, participation with social and unique educators, etc.).

During the workshops and professional dialogues, the participants emphasized the importance of professionalizing systemically, such as in a step-by-step, permeable qualification system for instructors of vocational schooling and training, to advance the excellence of teaching and training while developing career and professional opportunities. This would increase the importance of vocational coaching and likewise boost the sought-after appreciation of the training personnel responsible for organizing, executing, and supervising educational operations. This could be a turning point, along with the hiring of professionals with bachelor's and master's degrees, for the desired equivalence of vocational and academic schooling. In contrast, there is a need for the consistent and collaborative development of pre-existing continuing educational roles throughout learning platforms in a modular extension of DQR-5. To this end, there has been scant integration of such courses with those on lifelong learning to generate notable acceptance of the strengths acquired through professional accomplishments.

Finally, there should be a commencing qualification system for trained personnel in their training period to advance further through a modifiable and joint advancement path leading up to instructor status. Subsequently, industry- and end-user-oriented modular lectures at the DQR-5 level should be offered. A cooperative learning venue in conjunction with educational divergence provides extra DQR-6 augmentation in its current higher education program (Certified Education and Training Educator). These classes accentuate specific theme-related focuses, including digital learning and teaching, specialized/social/pedagogical support, educational help, and internationalization, with the eventual goal of becoming a Certified Vocational Educator (DQR-7). These courses should also provide cross-professional training (teachers, trainers, education overseers, and personnel developers) and integrate university modules for more blended learning.

Study II

This study's main research aim was to uncover key traits that professional VET trainers and training managers determine about their work surroundings, the different informal and formal learning activities that they perform, and the barriers to learning that they face in their daily work. The participants judged their duties to be very intricate, with a balance between interesting new and customary tasks. They also highlighted a great assortment of opportunities to actively take part in teams and communicate with team members, supervisors, and employees through modes such as problem-solving sessions, meetings, or informal exchanges between departments and with coworkers.

The trainers and training managers also highlighted the relevance of skill mastery as an effective means of remaining up to date with lifelong learning. They mentioned individual and collaborative informal scholarly activities for this purpose as well: for example, discussions with co-workers, seeking feedback, or deliberately or inadvertently engaging in conversations. Each participant engaged in training, graduate studies, or licensed IT classes in addition to arguing in favor of persistent practice and lessons.

These results on the attributes of trainers' environments, informal and formal learning activities, and barriers to learning offer noteworthy findings on learning in a particular workplace. This is remarkably attractive for firms and Human Resource Development (HRD) in optimization-based staff occupational training and professional growth. These findings are also beneficial to singling out favorable learning atmospheres and transforming barriers into drivers of learning.

Especially addressing organizational fit problems helps reduce employee dismissal rates. The steps of learner alienation from the company and its goals clearly point out where possible HRD treatments or interventions can positively affect the total work environment on the individual and team levels. Giving companies various low-cost tools to prevent employees from quitting or avoid their constant alienation from company workflows and values is also possible.

Research on professional VET trainers and training managers regarding the circumstances for attaining knowledge in the workplace, informal and formal learning exercises, and barriers to learning grant noteworthy insights on the changing character of learning at the workplace in a particular domain (Harteis, 2022; Goller & Paloniemi, 2022). This study's participants depicted conditions for learning in the working environment as an energizer to acquaint themselves with activities, highlighting that barriers to learning are reliant on the work environment. The results featured the complexity of the workplace particularly as a learning condition that supplies catalysts for learning, opportunities to take part in learning, and even boundaries to learning. To understand

workplace intricacy, all of these measurements should be understood and attended to (Hager, 2019). This leads to a more refined comprehension of the workplace as an intricate learning ecosystem for individual learners, teams, and organizations.

Study III

Study III's measurement instrument is relevant to determining the barriers that VET professionals face when learning inside their organizations. As per Dolata et al. (2021), consultancy is a rigorous occupation with unimaginably intricate jobs (O'Leary, 2020), which necessitates continuous advanced education. Although analysis fundamentally centers on the helpful elements of learning (Jeong et al., 2018), there is little knowledge on how to determine what holds people back from gaining knowledge at the workplace. Therefore, both researchers and organizations can use this developed instrument to discover what impedes employee learning and work aspects that are not performing optimally, such as miscommunication, an unsatisfactory work environment, and lack of employee autonomy (Brion, 2021; Decius et al., 2021; Kim et al., 2021).

This measurement can also reveal the most impactful variables that can hinder learning in all realms (e.g., heavy control on the organizational level, team atmosphere on the team level, and personal dread at the individual level). It might offer even an initial point for justified and organized processes in organizational expansion. This validation study and the planned follow-up research demonstrate the great importance of recognizing, conceptualizing, and tackling barriers to learning at the workplace. Besides the scholastic debate in newspapers and conferences, this theme is common in more practical terms among professionals in the field.

To start, all those connected to Human Resource (HR) organizations and the businesses who took part in the study's interviews were kept informed at all research stages of the barriers to gaining knowledge and the initial research outcomes. There were also small individual workshops with continual feedback. Further, participants who took part in the online survey (N = 112) could register for a newsletter to receive recurrent data on barriers to learning and their functional effects. An e-workshop is scheduled as well to join academic and research-based techniques with daily organizational tasks to identify and handle barriers at the workplace. This meeting will integrate succinct but meaningful details on obstacles to gaining knowledge, cases, and good company practices made by HR managers and other investigators. Lastly, functioning groups can learn to distinguish, consider, and cope with barriers to learning in the workplace.

9.5 Implications for Future Research

The three studies each influence their specific research field, as well as offer combined implications for future research on the challenging work factors and barriers to learning in the workplace that VET professionals face.

The two explorative studies sat the tone and provided the research insights to develop a holistic measurement. This developed and validated measurement for barriers to learning is a particularly useful assessment that can pinpoint deficits in learning on the individual, team, and organizational levels, which is immensely advantageous for enterprises and HRD in the process of refining employee training and qualified career advancement. Therefore, it can help expose beneficial learning climates and convert learning limitations to advantages. Additionally, a newly constructed questionnaire based on the study's discoveries should further aid research on learning in the workplace to establish fresh perspectives on learning and promote career progression. As argued by Billett (2022) and Harteis (2022), exploration into the learning environment must be more imaginative and consider the often-overlooked facets of learning within the organizational context. This analytical metric meets this requirement in amalgamating the barriers to learning in different settings and organizational levels.

Barriers involving finances, construction, culture, hierarchical issues, access to knowledge, individual aspects, and team or interpersonal problems might hinder education and early career prospects, thus influencing knowledge, company advancements, and technological restraints. All these barriers to learning can be condensed into five factors: individual barriers (motivation or fears), organizational/structural barriers (hierarchy, team climate, and leadership), technical barriers (technical conditions), change (turnover intention), and uncertainty (career options), all on the individual, team, and organizational level.

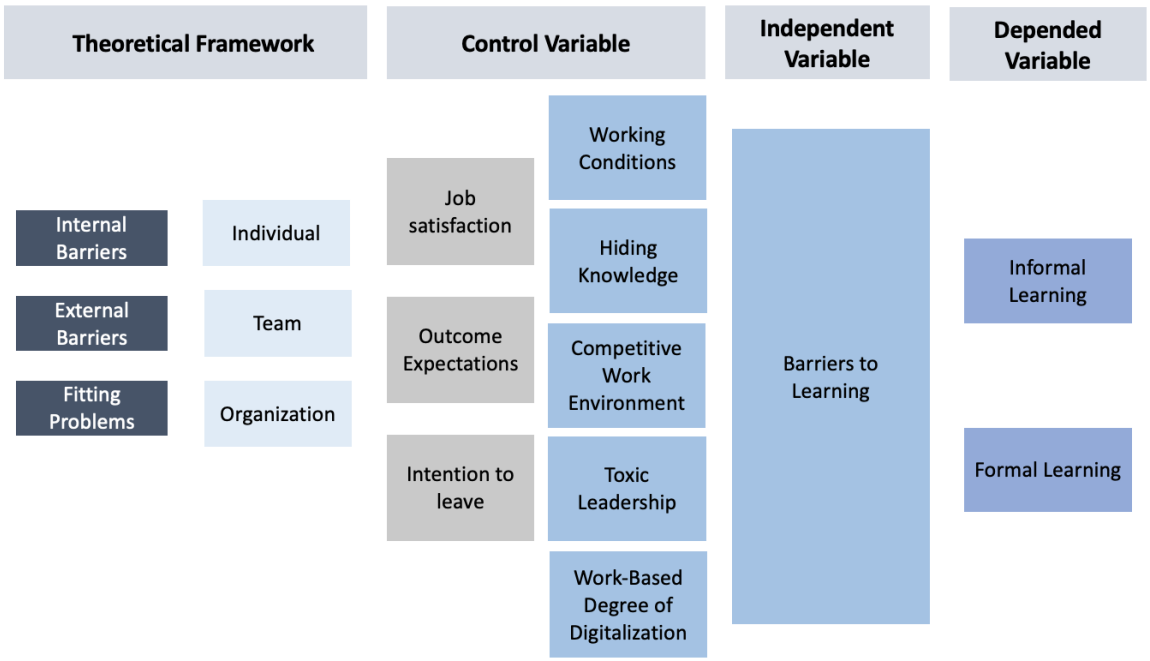
This thesis provides the first steps in detecting, identifying and measuring barriers to learning at the workplace. Nevertheless, more inquiry will bring greater clarity to the tangled bond between learning barriers and educational undertakings. It could be inferred that barriers to learning at various stages have different effects that form a mix of educational undertakings, making it exceptionally noteworthy to scrutinize these connections since people each prefer diverse learning methods in the workplace. This implies that barriers to learning form a spectrum based on particular learning circumstances, conditions, and capacities. As such, to have a superior understanding of educational pursuits, it is indispensable to reflect on both barriers and promoters of learning. The validated measurement tool can thus be utilized for extra holistic examinations of barriers in the workplace at the individual, team, and organizational level.

Taking these research results into account, the next step is a cross-sectional questionnaire of the multiple factors identified or theoretically assumed to have an impact on barriers to learning in the workplace, work-related factors, intention to leave, and professional career development. Moreover, this metric can help reveal the function of elements such as formal and informal learning activities (Brion, 2021); toxic leadership (Schmidt, 2008); competitive work environment (Fletcher & Nusbaum, 2010); and the degree of digitalization in the workplace (Görs et al., 2022). This questionnaire will comprise a set of validated scales to coherently locate barriers to learning to embed them in an overall context. The anticipated factors, all of which that incorporate aspects from the complex environment of barriers to learning, are:

- Informal Workplace Components (24 items; Decius et al., 2019)
- Barriers to Learning (53 items; Anselmann, 2022)
- Job Satisfaction (36 items; Spector et al., 1985)
- Toxic Leadership (52 items; Schmidt, 2008)
- Hiding Knowledge (14 items; Peng, 2013)
- Competitive Work Environment (59 items; Fletcher & Nusbaum, 2010)
- Work-Based Degree of Digitalization (27 items; Görs et al., 2022)
- Outcome Expectations (5 items; Betz & Voyten, 1997)
- Turnover Intension (10 items; Kenny et al., 2016)
- Biographic Dates (15 items)

This newly derived research on the barriers to learning in the workplace will make a distinct contribution to contemporary discussions about the challenging situation of VET professionals and detect the role of barriers to learning in the workplace. Figure 3 presents the newly developed research design for detecting barriers to learning at the workplace. The results of this research are meant to show the complex relation between barriers and learning activities, and in turn expand conceptions of factors that influence especially informal learning at work.

Figure 3 Newly developed research design for barriers to learning (own presentation)



The results of this study will further show that a focus on facilitating and inhibiting factors is important to encourage learning in the workplace. In addition, it is necessary to reduce learning barriers to promote successful learning. This requires additional studies designed to reveal what hinders individuals from learning in their organizations, that is, what is not working well or should be changed. This research can even serve as a starting point for justified and established steps in organizational development. Within this thesis a first step is done in order to contributes to current approaches to learning in the workplace and the concepts of new learning approaches (e.g., Decius, 2022) to establish a more holistic understanding of barriers to learning.

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11 Appendix

Appendix A Anteilerklärung an den Publikationen

Sebastian Anselmann hatte folgenden Anteil an den aufgeführten Publikationen:

Studie 1: Anselmann, S., Harm, S., & Faßhauer, U. (2022). Input from the Grassroots Level — Reflecting Challenges and Problems for VET Professionals in Germany. *International Journal for Research in Vocational Education and Training (IJRVET), 9*(2), 239–268

https://doi.org/10.13152/IJRVET.9.2.5

Beitrag im Einzelnen: 75 Prozent – Formulierung der Fragestellungen, Literaturrecherche, Konzeption Interviewleitfaden und Erhebungsinstrument für die Workshops, Auswertung der Interviews und Daten, Manuskripterstellung und -gestaltung.

Studie 2: Anselmann, S. (2022). Trainers' learning conditions, informal and formal learning and barriers to learning, *Journal of Workplace Learning, 34*(8), 742–764. https://doi.org/10.1108/JWL-11-2021-0152

Beitrag im Einzelnen: Alleinautorenschaft und Alleinerstellung –

Formulierung der Fragestellungen, Literaturrecherche, Konzeption Interviewleitfaden und Erhebungsinstrument für die Erhebung, Auswertung der Interviews und Daten, Manuskripterstellung und -gestaltung.

Studie 3: Anselmann S (2022). Learning barriers at the workplace: Development and validation of a measurement instrument. *Frontiers in Education, 7*, 880778. https://doi.org/10.3389/feduc.2022.880778

Beitrag im Einzelnen: Alleinautorenschaft und Alleinerstellung –

Formulierung der Fragestellung, Literaturrecherche, Entwicklung und Validierung des Messinstruments, Durchführung der Studie, Auswertung der Daten, Manuskripterstellung und -gestaltung.

Appendix B Eidesstattliche Versicherungen

Hiermit versichere an Eides statt, dass die Dissertation „Barriers to Learning – Identification and Measurement of Barriers to Learning at the Workplace in Vocational Education and Training (VET) and Consultancy“ selbstständig angefertigt wurde, wörtliche wie inhaltliche Entlehnungen kenntlich gemacht sind und außer den in der Dissertation genannten keine weiteren Hilfsmittel Verwendung fanden.

Zudem versichere ich an Eides statt, dass die Dissertation „Barriers to Learning – Identification and Measurement of Barriers to Learning at the Workplace in Vocational Education and Training (VET) and Consultancy“ weder im Ganzen noch in Teilen Gegenstand eines Promotionsverfahrens an einer anderen Hochschule war oder ist.

Des Weiteren versichere ich an Eides statt, dass die Dissertation „Barriers to Learning – Identification and Measurement of Barriers to Learning at the Workplace in Vocational Education and Training (VET) and Consultancy“ weder im Ganzen oder in Teilen Gegenstand einer anderen akademischen Prüfung oder einer Staatsprüfung war oder ist.

Schwäbisch Gmünd dem 15. März 2023 Sebastian Anselmann