

The workplace as a place of learning in times of digital transformation – models of work-related and work-based learning and in-company concepts

Abstract

The relevance of work-based learning (WBL) as a central element of TVET for improving the quality of TVET programs is increasingly being taken up in international education policy. The United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Labour Organization (ILO) and the World Bank Group (WBG) as well as the Organisation for Economic Co-operation and Development (OECD) promote the strengthening of WBL in the context of the establishment or further development of TVET systems. WBL in that sense primarily addresses the requirement to increase the labour market relevance through phases of experiential learning at the workplace. In such context, the quality of work with regard to its conduciveness to learning i.e. competence development is decisive. Learning at the in-company workplace – in the meaning of this article – is not to be seen as a result of didactical intervention, but as a consequence of changing work organisation, the digitalization of work, and an increasing quality of work conducive to learning and competence development.

This article presents models of WBL that reflect the proximity to the workplace, the quality of work with regard to its conduciveness to learning, and in-company learning concepts. The article concludes with remarks on the company's training personnel, who play a key role in successfully designing WBL.

Keywords: TVET, work-based learning, work-related learning, in-company learning

1 Introduction

Work-based learning (WBL) is increasingly becoming a central requirement of TVET policy internationally (Schröder 2020). It is characterized by the fact that formal and institutional vocational education processes are conceptually enriched with labour market-relevant, informal hands-on learning at a company's workplace or organized learning is combined with practical experience. For WBL as a model of learning based on the world of work, three forms can be identified: "apprenticeship training (dual vocational training)", school based vocational training with learning phases at the workplace", and "WBL in school" (NA at BIBB 2017, 6).

The obvious and frequently cited advantages are a greater labour market relevance of vocational training and an improved transition of acquired competences on entering employment. In view of the enormous challenges facing vocational education and training systems worldwide in the coming decade (ILO 2017a), it is only logical that international organisations such as UNESCO, World Bank Group (WBG) and the International Labour Organisation (ILO) as well as the OECD have included the conceptual integration of work-based learning in their agendas whilst strategically positioning their educational policy and promotion thereof accordingly (UNESCO 2016, ILO 2017b, & ILO/WBG 2013).

A further development of the more modern approach to work-based learning is to link it to formal vocational training processes and qualifications. In international discussions, the focus is often on legal requirements, incentives for stakeholders and governance structures (UNESCO-UNEVOC 2013, IAG-TVET 2017, & Hoftijzer et al. 2018). Organisational and structural designs and conceptual approaches, relating to apprenticeship, for example, are extremely diverse. The number of countries with work-based learning approaches is surprisingly large, in the regional area of the European Training Foundation (ETF) alone (Sweet 2014). However, the lack of uniform definitions and concepts hinders the systematic development and implementation of work-based learning at the international level.

Work-based learning has a long tradition in the academic discussion of vocational and occupational education; over the years it has been conceptually sharpened, typologically differentiated, tested in practice and conceptually developed. In this form, WBL goes beyond state governance structures, stakeholder organisation and legal foundations. Rather, it addresses the preconditions for efficient competence acquisition at the learning base of the company in dealing with specific work tasks and processes from the point of view of the conduciveness of work to learning (Dehnbostel 2008a; Schröder & Dehnbostel 2019). Conduciveness of work to learning requires a quality that is appropriate to the learners' level of competence development, as not just any work activity in the company can be guaranteed to contribute to competence development.

In addition to the organisation of work, central elements to support learning in work are the quality and level of qualification of in-company training personnel, i.e. the in-company trainers or instructors for initial or advanced TVET, or skilled workers providing initial and further training. In many English-language publications, in-company trainers or trainer for practice, who focus on skills development, are referred to as TVET teachers. In-company training staff must have the necessary expertise for in-company work, in terms of work organisation, processes and quality of work. It is up to them to decide which of the different forms of workplace learning can best be implemented at the work place. At the same time, digitalisation opens up a range of further perspectives for additional work-based forms of learning. TVET teachers - in contrast to TVET trainers - have to fulfil a different function, as they are primarily focused on technical education, permeability and lifelong learning. Both groups of TVET personnel are relevant for a high quality TVET system.

This paper discusses the potential of the workplace as a place of learning, especially from the point of view of digitalisation, models of work-based learning, work design that is conducive to competence development, and concepts for workplace learning. In-company training staff, TVET instructors and trainers as well as education and training professionals have a key role to play in workplace learning and in the implementation of the WBL concept on the company side.

2 The Workplace as a Learning Venue

The potential of the workplace as a place of learning for an individual's competence development is unique in comparison with other places of learning. Learning at the workplace is the oldest and most widespread form of vocational learning. Located at the place of work, it relates to the respective object of work and occurs in the process of working. Work-based learning is accomplished when the place of learning and the place of work are identical. It therefore describes a local and task-specific area of learning that combines working and learning from a didactic-methodological point of view. However, this also shows the tension between economic or operational expediency and subject- and education-related objectives that underlie the dual function of the workplace as a place of work and learning.

Learning in the workplace already existed in the form of craft apprenticeships in the Europe of the Middle Ages. There was a clear structure of occupational levels, divided into master, journeyman and apprentice. In a master apprenticeship, learning was done by watching, imitating, participating, helping, trying and simulating. From the point of view of modern vocational education and training, learning in the workplace was first considered with the development of education in the 18th century and then more systematically in the course of industrialisation (Stratmann 1993; Greinert 1994). In industrial society with Taylorist work structures based on division of labour and monotonous, repetitive work activities, learning at the workplace became less important. The workplace could hardly serve as a place of learning in well-planned industrial work processes.

Since the emergence of new work and organisational concepts and the beginnings of digitization in the 1970s/1980s, learning in and at work has undergone a fundamental change that equally encompasses its goals, content, forms and methods. With increased learning potential and increased qualification and competence requirements, the workplace as a place of learning has gained in importance again, which is among other things in the formula of “learning in the process of work” and the introduction of work-integrated forms of learning organization such as learning islands and work and learning tasks (Schröder & Dehnbostel 2019, 7 ff.).

Increased learning opportunities in general and opportunities at the workplace as a place of learning in particular can make learning attractive to those who have developed inhibitions, or resistance to learning and refuse to learn in organized situations. The benefits for socially disadvantaged young people with poor school experience become particularly clear in

parttime qualification for young adults and in further training measures for older employees. Ideally, the workplace as a place of learning creates motivation, brings meaning and insight, incorporates experience and subjective dispositions, enabling development and illuminating career paths.

In summary, the advantages and disadvantages of learning at the workplace can be listed in a tabular comparison as follows:

Table 1: Advantages and disadvantages of learning at the workplace (Dehnbostel 2010)

Advantages	Disadvantages
Seriousness, practical relevance and commitment	Dominance of individual company work and business processes
Competence development under real conditions	Competence development in situational contingency and dependency
Meaning, motivation and formation of identity through real work	Learning resistance due to monotonous or externally determined work
Flexibility, openness and modernity of learning content	Dependency of the learning content on operational conditions
Immediate application and transfer relevance of learning	One-sided control of learning via work tasks and logic

Learning at the workplace is intensifying as digitalisation progresses; informal learning in particular is contributing to an increase in learning, process and reflection in relation to work at the workplace. In the process, learning is becoming less restricted in terms of time, place and space; it is no longer limited to individual sequences, and certainly not to formal, institutionalised education. Employees are increasingly using interactive learning opportunities and e-learning forms such as blended learning, webinars, learning platforms, mobile learning and augmented learning. The focus is on the process of work, as digital technologies increasingly become digital media in human-machine interaction.

Digital learning thus becomes a constitutive component of digital work at the workplace as integrated learning. It mainly takes place as purely informal learning, subject to the logic of the work process. Informal learning at work involves experiences made in and through work actions. It produces a learning outcome that results from coping with situations and solving problems at work. Studies indicate that, 60-80 per cent of a skilled worker's actions related to competence and professionalism in a company are based on informal learning processes. This percentage, which can be differentiated for specific sectors and companies, generally increases with the digitalisation of work processes.

The importance of informal learning also marks the serious difference between digital work and the division of labour and repetitive work of the traditional industrial age. This was - for technological and business reasons - removed from all claims to learning and innovation; it was planned and ordered to the exclusion of situations of uncertainty, self-control and learning. In principle, working and learning were separate in Taylorist work processes, whereas, with digital work, they are integrated in the workplace. Thus, digital learning as work-integrated learning is a milestone in the history of modern qualification. Establishing informal and non-formal learning on an equal footing with formal learning in the European Qualifications Framework (EQF), as confirmed in 2008, is a ground-breaking, unequivocal expression of this development.

The continuing pluralisation and dissolution of workplace learning boundaries is reflected in the expansion of workplace learning spaces and their extension to include physical and virtual learning architectures. The workplace as a place of learning is thus becoming a site of meta-learning. The learning concepts outlined in section 4 are increasingly finding their way into workplace learning and are adding purpose and direction.

3 Models of work-related and work-based learning

Neither in VET research nor in related disciplines has there been an analysis and inventory of models or types of learning at work and - more broadly - learning with reference to work. In contrast to the work-based learning described at the beginning, the relationship between learning and work is not considered from the perspective of institutionalised vocational education and training, but from the perspective of the workplace and work as a place of learning.

A uniform typology is also difficult to establish, as this is presented differently from the perspective of different academic disciplines. Across the board, the distinction between "learning on the job" and "learning off the job" is highly accepted and widespread; however, the rough differentiation of learning on or off the job has only limited analytical value. A number of studies are available on learning on the job. Eraut (2007) distinguishes three forms of learning on the job on an empirical basis. More precise classifications or models of learning on the job with reference to work are essential for practical and -conceptual development, in terms of justification as well as comparative evaluation of work-related learning.

Learning related to work can be subsumed under the collective term "work-related learning"; it refers to learning processes that relate to work and work processes in the broadest sense. The term is semantically broad and is often used synonymously with terms such as workplace learning, learning in and at work, workplace learning and decentralised learning. The most viable differentiation of work-based learning into the three models or variants of "work-based learning", "work-linked learning" and "work-oriented learning", carried out in the 1990s as part of the pilot research of the Federal Institute for Vocational Education and Training

(BIBB), has proved to be the most effective, whereby the fundamental distinguishing feature is the learning location and learning organisation-related criterion of the relationship between the place of work and the place of learning (Dehnbostel & Schröder 2017, 4 ff.):

- In work-integrated learning, the place of learning and the place of work are identical, learning takes place at the workplace or in the work process. Examples are: online communities in the workplace; traditional side-by-side apprenticeships; adaptive qualification in continuing vocational training; workplace learning, increasingly adopted from Anglo-Saxon.
- In work-connected learning, the place of learning and the real workplace are separate, but there is a direct spatial and organisational connection between the two, e.g. in quality circles, in the learning workshop and more recently in the context of learning factories and learning labs set up in digital working environments.
- In work-oriented learning, there is no direct connection between the place of learning to the place of work. In institutionalised learning places, however, subject content-oriented references to work are included in the curriculum. As special institutions in the education system, training firms, learning offices and production schools are also oriented in a holistic way to work content and environments. In addition, the simulation of work outside of work takes place in reality-oriented models at different locations.

The differentiation into three models of work-related learning has proven its worth. Nevertheless, the diversity of work-related qualification concepts and forms of learning organisation is not sufficiently differentiated. On a more developed level of differentiation, taking into account additional learning conceptual and organisational criteria, five basic forms of work-related learning can be distinguished to which different qualification concepts and learning organisation forms can be assigned. As the following table shows, individual concepts and forms can be assigned to several basic forms.

Table 2: **Basic forms of work-related learning (Dehnbostel & Schröder 2017, p.4)**

Basic forms of work-related learning	Qualification concepts and forms of learning organisation
1) Learning through work action in the real work process (work-integrated learning)	Communities of Practice (CoP); traditional side-by-side gauge; adaptation qualification; learning on the job; workplace learning
2) Learning through instruction, teaching and guidance in the workplace (work-integrated learning)	Forms of instruction; learning process support; coaching; mentoring; collegial advice; adaptive assistance and learning systems

<p>3) Learning through integration of informal and formal/non-formal learning</p> <p>(work- integrated learning or work-connected learning)</p>	<p>Online-communities; quality circle; learning workshop; learning island; working and learning task; forms of coaching; forms of e-learning; learning factory; learning lab</p>
<p>4) Learning through internships and in-company explorations</p> <p>(work-integrated learning or work-connected learning)</p>	<p>Work placements from schools, educational institutions and universities; exploration and rotations within the framework of education and training measures</p>
<p>5) Learning via learning plan references, work tasks and simulations</p> <p>(work-oriented learning)</p>	<p>Vocational learning in schools, educational institutions, training firms, learning offices, universities, simulation sites</p>

The spectrum of different basic forms of work-related learning will certainly remain in the future; digitalisation in particular speaks for its further pluralisation, as well as for associated concepts of qualification and learning organisation forms.

4 Work design conducive to learning and competence-development

Workplace design optimisation has been identified as a specific task through the awareness that work is to be distinguished spatially, temporally and organisationally from the living world. Work design measures and methods have existed for centuries, even if they were not perceived or designated as such.

Designing work in a way that is conducive to learning and competence development is both an opportunity and a necessity for companies: a necessity insofar as the digital transformation of the world of work demands learning at work and thus working environments that are conducive to learning; an opportunity because it can enable or improve innovations and developments in the sense of a learning company and in the interest of the employees.

For employees and companies alike, work design that promotes learning and competence offers advantageous opportunities for development. For the individual, work and employability as well as professional development and career paths depend essentially, and in many cases decisively, on the opportunity to learn in and at work and to expand one's own professional competence. This requires a design of work that promotes learning and competence, linked to organised training and further education measures.

For companies, the digitalisation of the world of work, continuous improvement and innovation pro-cesses, learning and knowledge-based work tasks and work-related human

resources development require work to be designed in such a way that promotes learning and skills. Such work design leads to increased efficiency and effectiveness in work processes and has thus become an economic factor for competitiveness in national and international markets. In this respect, the creation of working conditions conducive to learning and competence is already essential for operational-economic reasons.

Finally, work-based learning and its design are fundamental to lifelong learning in the digital world of work and life. By designing work in a way that promotes learning and skills and integrating it into a company's learning concepts, as described in section 5, education and employment systems grow more strongly aligned. Individual, company and societal interests thus come into direct contact and complement each other. Work design that promotes learning and competence has a personal and societal dimension that goes beyond the world of work.

Concepts and criteria for work design that promotes learning and competence have been developed and applied since the 1980s (Dehnbostel 2008b; Schröder & Dehnbostel 2020). At the current state of the discussion and scientific knowledge, there are seven criteria underpinning work design that is conducive to learning and competence development. They can be summarised in table form as follows:

Table 3: Criteria of a work design conducive to learning

Criterion	Brief description
Complete activity/project orientation	Related task processing in terms of complete activity and project method; expanded context in the course of digitalization
Scope of action	Degree of freedom and decision-making in work, opening up possibilities for self-regulated, competent activity
Problem and complexity experience	Inner and external experiences under demanding qualification requirements; uncertainty, virtual expansion, and networking heighten problem and complexity experience
Social support/collaboration	Social relationships, interactions, communication in work. Expansion in the course of digitalization
Individual development	Interrelation between qualification requirements and competence development; participation,

	self-regulation, and competence balance serve to strengthen subjectivisation
Professionalisation	Expertise and increase of knowledge via successful activity strategies, digital networking, and further education
Reflexivity	Opportunities for structural reflexivity and self-reflection; digital competence strengthens reflexivity

The criteria serve both the analysis and the construction of work design that promotes learning and competence. Practical and design-related application depends essentially on the extent to which they are compatible with company-related circumstances such as sector affiliation, company size, work and organisational concepts and company culture. They cannot be regarded as quality criteria per se, because whether they promote or hinder learning depends largely on individual characteristics such as the developmental stage, attitudes and the learning background of the individual. For example, a large scope of action may be conducive to learning for one person, but inhibit learning for another. The question of whether work is conducive to learning and competence is therefore not only subject to objective criteria such as learning potential and learning opportunities, but must also always be seen in relation to the individual subject.

5 In-company learning concepts

Learning concepts in the workplace have increasingly gained importance with restructured organisational concepts and the digital transformation of work. The underlying theoretical approaches, as shown below, have their origin in learning theory approaches of action- or project-oriented organized environments of teaching and learning, but in the company context they are given a work-related outset through their combination with company methods, basic forms of work-related learning or personnel development measures. They are situated in a work context that is determined by work organisation, technology, qualification and social factors and differ in their specific learning-aims. Whereas conventional learning in training workshops, courses and in further training for adaptation mainly followed the dominant teaching perspective of instruction, today's approach-centres on user- and subject-related learning theory, with informal learning very much part of the process.

Following on from and updating the learning concepts presented by Dehnbostel & Schröder (2017, 8 ff.), the most important current learning concepts in work are e-learning (1), situated learning (2), organisational learning (3), experiential learning (4), self-directed learning (5) and reflective learning (6). In terms of learning theory and didactics, they focus on constructivism, action orientation and holism. Informal learning in particular plays a key role in learning theory.

(1) E-Learning

By definition, e-learning refers to all forms of learning and teaching in which electronic or digital media are used in the application of learning materials or serve interpersonal interaction. In short, e-learning is learning and teaching with electronic or digital media in formal or non-formal contexts. In addition to organised e-learning, informal learning in the course of work in digital work environments can also be counted as e-learning in the broadest sense. Organised e-learning is carried out in various forms, from web-based training (WBT) to blended learning to mobile learning. In terms of teaching and learning methods, e-teaching, e-tutoring and e-coaching have been introduced with e-learning.

(2) Situated learning

The concept of situated learning is based on individual and collaborative learning processes that emerge through interactions in the social context of a community of practice (CoP) (Lave & Wenger, 1991). Situated learning takes place in the constant action and activity of a social group with its specific goals, competences, structures and rules. The process of growing into the group, becoming a full member and continuing to belong to the group includes not only the acquisition of competences mastered by the group, but also habits, attitudes, values and cultural practices. Situated learning is a form of enculturation, of integration into the learning and working culture of a community. This takes place through informal learning and is sometimes combined with formal and non-formal learning.

(3) Organisational learning

Organisational learning applies the concept of learning to the supra-individual level of the organisation and is defined differently from the perspective of different disciplines and scientific theoretical orientations. It is organisational learning that takes place in the interaction between the individual and the organisation and focusses on the ability of organisations to develop in a targeted way (Senge 1990). While individual learning aims at the acquisition of individual knowledge, skills and the development of competences and education, the purpose of organisational learning is the acquisition of collective knowledge, collective values and norms as well as collective development of competences and culture. It is informal but needs to be extended to include formal and non-formal learning in order to promote holistic human resource and organisational development.

(4) Experience-based learning

Experience-based learning - also referred to as experiential learning - is learning that takes place through perceiving, feeling and purposefully reflecting on experiences. Intensive experiential learning takes place in work when actions are associated with problems, challenges and uncertainties, then reflected upon. Experiential learning

follows Dewey's process of experience in the sequence of action - experience - reflection and its uninterrupted continuation, taking into account previous processes of experience and knowledge (Dewey 2010). A learning process takes place through experience, which can be classified as informal learning. In real work processes, informal learning merges with organised learning, for example in online communities or learning islands.

(5) Self-directed learning

Self-directed learning refers to independent, self-determined control of learning processes. Learners determine the goals and content of learning largely independently, as well as the methods and tools to implement learning processes. Classification of the respective learning situation is, however, predetermined in educational pathways or work processes. This is not the case in self-organised learning. Self-directed learning involves independent design of learning opportunities and learning paths within a given framework. While self-directed learning in organised learning places and spaces is part of formal and non-formal learning, it is largely informal in the process of work.

(6) Reflective learning

Reflective learning is particularly suited to the changed learning and working conditions in modern work processes and the digital transformation of in-company training, as the systems thinking and problem-solving skills associated with digitalisation require reflection. Reflective learning is learning that takes place through understanding and consciously reflecting on experiences. It is thus complementary to experiential learning. According to Lash (1996, 203 f.), reflective learning in work involves two types of reflexivity: structural and self-reflexivity. While structural reflexivity aims to make people aware of rules, resources and work structures and to help shape them, self-reflexivity aims to get people reflect on themselves.

These learning concepts may not be clearly distinguishable from each other, but are complementary to varying degrees. In some cases they may overlap. Selection and application within the framework of qualification concepts and measures is usually carried out with direct reference to work requirements and the working environment as well as to criteria directly related to the place of learning.

6 Outlook: Key role of in-company training staff

In the international discussion on WBL, the key to high-quality qualification at the workplace is seen in company training personnel (UNESCO-UNEVOC, 185). In-company training personnel is a widely differentiated group of people that includes trainers, continuing education instructors, coaches, personnel developers, learning process facilitators, lecturers, teachers, coaches, mentors and training managers. Despite the relevance for WBL, an

international comparative study on the functions and profiles of in-company training personnel remains a research desideratum.

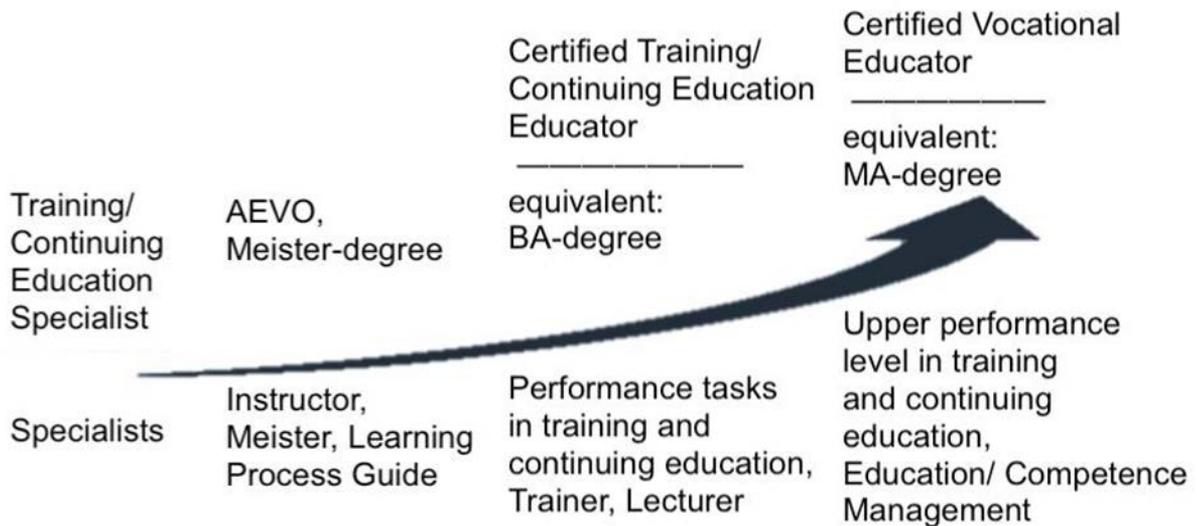
For the day-to-day support of learning and competence development in the workplace, primarily so-called training and continuing education professionals are involved. These are skilled workers who accompany and support trainees and employees in their work without a formal qualification in vocational and further training. They acquire work and vocational pedagogical competences for this in informal or non-formal ways. For vocational training alone, the estimated number of skilled workers providing training in Germany is around five million, and the number of skilled workers providing further training is likely to exceed this figure considerably.

With the digitalisation of work, in-company training personnel are confronted with fundamentally changed tasks that result from the upheavals of digital transformation and thereby expand and enlarge their area of responsibility in vocational and further training as well as personnel development. Learning at work takes on the opposite meaning to industrial-Taylorist work processes in that it is no longer excluded in digital work but constitutively included. This repositions in-company training personnel with a focus on supporting, promoting, accompanying and assessing qualification processes in and at work.

Unlike school education staff (TVET teachers) in VET (Busian/Schröder 2015), there is no traditional or professionalised vocational qualification for company education staff. However, the need for this has been clearly recognised by the stakeholders involved in VET since the 1970s/1980s against the background of new work, organisational concepts and the onset of digitalisation. The measures taken have led to a three-tier formal qualification system in Germany.

This three-level formal qualification system for non-school-based VET staff consists of the "Trainer Aptitude Ordinance (AEVO)" from 1972, which has been amended twice, and two further training occupations: "Certified Initial and Continuing Training Educator" (2009) and "Certified Vocational Educator" (2009), which are assigned to levels 6 and 7 of the German Qualifications Framework (DQR) and the European Qualifications Framework (EQF) respectively. Below the level of the AE-VO, there is the level of training and further training specialists in companies themselves. This adds up to a four-tier qualification model in the companies, presented in the following overview.

Figure 1: Career pathways and qualification model of non-school-based TVET staff



For in-company training personnel, this offers opportunities for professional development and promotion that begin at the skilled worker level with additional scope for informally or non-formally acquired training competences (initial and ongoing), leading to BA and MA degrees via the AEVO. This four-level model is currently being implemented; it has had little traction at upper level in companies so far. Moreover, qualification and needs analyses show that it needs to be expanded above the AEVO level and below the level of Certified Initial and Continuing Training Educator, especially at DQR/EQR level 5. Nevertheless, with the four-level in-company qualification system, there is a fundamental and indispensable basis for further professionalisation and vocationalisation of in-company and vocational training personnel.

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