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Perspectives and Criteria for Supporting Holistic Competence Development in Work-Processes

Abstract

Socioeconomic megatrends such as digitization, internationalization and demographic change are having an increasing impact on shaping the world of work and are effecting a profound transformation of work-processes and work organizations in companies. Skilled workers must be able to react appropriately to these changes, which requires a corresponding competence development. The introduction of new concepts of work and organizational concepts as well as the objective of acquiring reflexive action competence are accompanied by a change of perspective: learning in the work-process is undergoing a renaissance, as the learning content of work-processes is again being very strongly acknowledged nowadays.

In this context, continuing vocational education and training are required to respond with appropriate TVET programmes and structures. Consequently, companies are faced more than ever with the challenge of shaping work-process-related learning in such a way that it is not merely situational and random, but fosters the aimed development of competences. A few concepts for in-company training have already been established but have so far not been sufficiently investigated in relation to the importance of this issue. Although the approaches differentiate between the relationship of the place of learning and the workplace, an elaborated theoretical foundation of the criteria that support learning is still a research desideratum.

Therefore, the main question is how work-process-related learning can be shaped and organized in company work-processes from a didactic-methodological perspective and in reference to learning theories. Based on the concept of work-process-related learning that has been developed, this article discusses criteria for competence-promoting work designs and applies these exemplarily to empirically determined fundamental fields of action. Previous studies and experiences from the corporate working environment have been evaluated and summarized in order to define these fundamental fields of action, leading to specific recommendations for work-process-related learning.

***Keywords**: Work-based learning, work-process, competence, work-process knowledge, learning*

1 Introduction – The importance of connecting learning and working

Since the origin of the humanistic educational ideal, respectively since the institutional separation of academic and vocational education, the opportunities the workplace can offer as

a place of learning are not immediately obvious to many learners. This discussion is not only academically driven (Georg 1996, 637 f.), but also, at first glance, not always purposeful in the sense of the vocational pedagogical understanding of learning in the work-process in the context of training and further education in companies. When asked about learning locations in the context of their training, for example, apprentices would invariably answer: "Learning takes place at (vocational) school, work takes place in the company." Learning processes in and through work are usually not recognized as such, which is particularly due to a one-sided and culturally influenced understanding of learning (Rausch 2011, 320). Learning is often equated with formally acquired and thus obviously examination-relevant knowledge, not with learning processes in work situations at companies. Similar arguments are also used in further education and training: the highest learning effect is attributed to the seminar-based learning venue. In addition, however, the exchange of experience and expert knowledge in informal contexts (e.g. in "coffee breaks" or during a joint dinner after the formal, school-based learning unit) plays an important role (Spöttl & Schulte 2012).

Therefore, learning in and within work-processes has become increasingly important in recent years since global megatrends such as demographic change, internationalization and the digital transformation are gradually changing the environment in which we live and work. The permeation of the working reality with new technologies and trends is leading to increasing flexibility and fundamental changes in work-processes. Digital networking is catalyzing the development of new business models, also by changing and optimizing process flows and work organizations. In short, a general and cross-industry change in work and organizational concepts is taking place. As a result, skilled workers must be able to cope with the new requirements for action and respond appropriately to the ongoing changes. As a consequence of this dissolution of boundaries and plurality of work tasks, there is a need for an overarching vocational education objective, namely the development and shaping of action competence (Schröder 2004, 37; Dehnbostel 2007, 11; Spöttl et al. 2021). Professionals should be increasingly able to cope with the outlined social and professional changes and to participate actively in shaping them (Schröder 2008, 44; Pahl 2016).

In contrast, however, qualification programmes do not sufficiently take into account the development of self-organized learning. Learning in school-organized teacher-student arrangements at institutionalized venues requires the focussed development of reflexive action competence. This reflexive action competence describes the ability to reflect on the structures and organizational forms of work as well as on one's own actions in the work-process in the phases of preparation, performance and evaluation. The focus here is on "the conscious, critical and responsible assessment and evaluation of actions on the basis of one's own experience and available knowledge" (Dehnbostel 2007, 42) and thus encompasses an interaction between professional action competence, the organizational framework conditions of work and individual dispositions (ibid., 42).

Vocational education and training and further in-company training therefore need to respond with sustainable concepts. There is a need for a firm interlinkage of learning in real work situations and theory-based knowledge transfer as well as modern forms of learning for work-

process-oriented (in-company) learning. In this context, an important role for competence development processes is played by experience-based learning, i.e. learning in the work process that is not goal-oriented and planned, but incidental (Dehnbostel 2015, 2; Becker et al. 2001). In the current discourse, experience-based learning and competence development processes are therefore given higher status than formal learning and continuing education processes. This is accompanied by a change in the perspective of vocational-in-company learning: The company workplace is becoming increasingly important as a learning venue – learning in the work-process enables the acquisition of action competence and reflexive ability to act (Dehnbostel 2007, 44; Spöttl et al. 2021).

In this context, however, it should be noted that although work-processes basically provide learning potential, workplaces are not per se designed to promote learning (Rausch 2011, 3; Dehnbostel 2015, 54). Many companies sometimes trust that learning takes place in the direct work-process on an experiential basis (Becker et al. 2001). In fact, experiential learning also takes place without targeted pedagogical support and reflection in a wide variety of work activities – nonetheless, the shaping of didactically prepared situations and suitable framework conditions with regard to the activities in the work-process (Severing 2003, 2) is essential for an intentional development of competences.

How can work-process-related learning in the company be didactically and methodically shaped? The following article discusses competence-promoting criteria for learning in the work-process by addressing different perspectives on learning (see chapter 2), criteria of a work design that promotes learning and competence (see chapter 3) as well looking at results so far and further needs and focus on research (see chapter 4).

2 Workplace learning and learning in the work-process

In Germany as well as in the international research community, learning in the process of work is discussed and referred to in many different ways. In the Anglo-Saxon world, different terms are used interchangeably. In general, these terms refer to self-directed, process-oriented and lifelong learning, which essentially contributes to the development of (professional) competences. This can take place both in the workplace but also in a formal educational institution (Bahl et al. 2019, 13 f.). Allan (2015, 1), in his attempt to conceptualize workplace learning, also points to the conceptual confusion resulting from a lack of a uniformly accepted definition of learning in the process of work. Accordingly, a detailed analysis and inventory of models of learning in and about work remains absent from the current research discourse (Dehnbostel 2007, 44). In order to facilitate and structure the discourse, centrally discussed (vocational pedagogical) systematization approaches for the conceptualization of learning within work-processes are presented below.

2.1 Systematization of learning and work

A possible approach to a viable typology is offered by the generic term work-based learning, which is, however, semantically broad. It is often used synonymously with terms such as

workplace learning, learning on the job, work-integrated learning, and work-process-oriented learning (Dehnbostel 2015, 31; Dehnbostel & Schröder 2017, 5). In this context, work-integrated learning is first of all understood as all learning processes in companies, outside companies, and schools that relate to work and work-processes. "Learning takes place in work, at work, and about work, encompassing a broad spectrum of orientations and understandings" (Dehnbostel 2015, 32).

Due to a lack of a generally accepted definition of workplace learning opportunities, a variety of forms for shaping and combining learning and working in the workplace context are described in the literature (Dehnbostel 2018; Becker & Spöttl 2001; Becker et al. 2001). Already in the 1990s, Dehnbostel differentiated for the integration of working and learning between work-related, work-oriented and work-integrated forms of learning. Learning in the work-process increasingly prevails for all forms of learning, in which a separation between working and learning is removed and the process reference is emphasized. Dehnbostel differentiated (Dehnbostel 1998, 182) the organization of operational forms of learning into

- *work-based learning* (learning location and workplace are identical, e.g. learning islands and company learning stations),
- *work-connected learning* (spatial and work-organizational connection between place of learning and workplace, e.g. technical centres and model training places) and
- *work-oriented learning* (learning location and workplace are spatially and organizationally separated, e.g. business and production-oriented learning in educational institutions) (Becker & Windelband 2021, 31; Dehnbostel & Schröder 2017).

Thus, while learning was adjacent to work, e.g. in learning islands in production, in which a clear dividing line between working and learning could be discerned (even if "work orientation" was already a guiding principle here), the value of informal forms of learning in work was gradually recognized. Baitsch & Frei (1980) also began to state the relevance of work-immanent qualification in the early 1980s already and to systematically include incidental learning as a relevant form of learning in distinction to intentional learning. Livingston (1999) then differentiated intentional learning forms from informal learning forms. Livingstone characterized informal learning as the "independent acquisition of significant new knowledge or skills that endure long enough to be recognized as such in retrospect" (ibid., 69) and thus distinguished this learning from incidental learning processes shaped solely by experience. UNESCO also subscribed to this classification. In the context of the debate on lifelong learning, the European Commission attempted to clarify the term (EU 2001, 33 f.), in which a clear distinction should be made between formal forms of learning (in an educational institution), non-formal forms of learning (outside of educational institutions) and informal forms of learning ("in everyday life"), but this proves to be unsustainable in the age of the integration of working and learning in the workplace, since workplace learning can certainly take place formally, but independently of (educational) institutions (Becker & Windelband 2021, 31 f.).

To date, the dividing lines between formal and non-formal forms of learning are fluid; as a rule, they follow organizational classification. Organizationally structured forms are assigned to the first group, non-organizationally structured forms to the second group (cf. Figure 1). The distinctions are important, for example, in terms of whether a form of learning can be assigned to continuing education or not, or whether the value of such learning can be "validated" (CEDEFOP 2009) and used in education systems (for example, for access to examinations or for assignment to qualification levels of what has been learned) (Becker & Windelband 2021, 32).

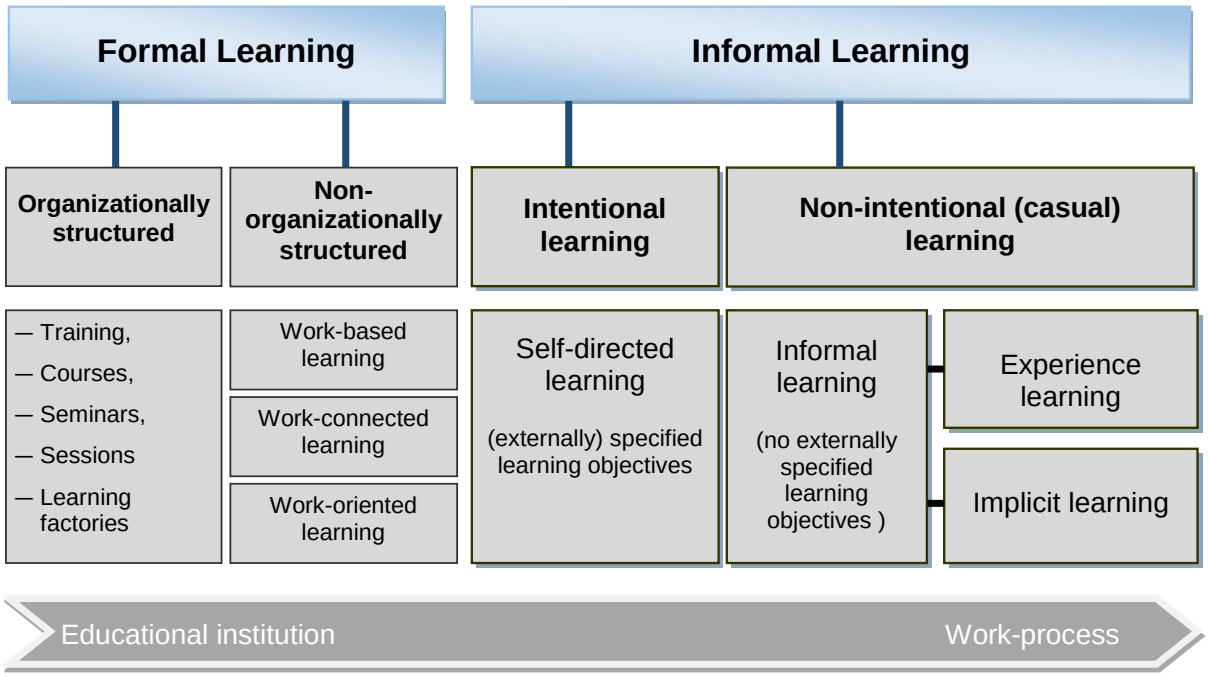

Figure 1: Spectrum of operational forms of learning (Becker & Windelband 2021, 32)

The non-formal forms of learning are usually based on theories of situated learning or are oriented towards constructivist didactic approaches (Gerstenmaier & Mandl 2001). Therefore, self-directed learning and process oriented learning are two central features for approaches which connect working and learning, especially in the context of workplace learning.

The importance of learning in the process of work is increasing in almost all areas of vocational training and continuing vocational education. In companies, self-directed and experiential learning in the process of work is increasingly promoted and combined with formal learning opportunities. Qualification times at the workplace are being increased (Qualifizierungschancengesetz 2018) and forms of learning organization integrating work and learning are being further developed. Work environments and systems are being created (Becker 2018) that facilitate the integration of learning and work.

Moreover, learning in the work-process is increasingly recorded and recognized in different educational courses of the education system, even if one cannot yet speak of standardized

processes. Nevertheless, this development leads to a reduction of the distance between learning and working and thus further underpins the importance of learning in the work-process.

2.2 Work-process orientation as Innovation

In learning in the work-process, the acquisition of knowledge that cannot be objectified plays a major role, which ultimately means that experiential learning is of particular importance. This can, for example, be a kind of troubleshooting in which skilled workers learn about the function of machines and systems via cause and effect relationships, but it can also be interaction with colleagues to exchange data that goes undocumented. Through learning in the work-process, practical knowledge of action and theoretical knowledge are merged into expert knowledge on the way from experience to knowledge and from knowledge to ability, there is integration in practical action in the context of work. Ultimately, this is what is typical and characteristic for being an expert.

The goal of vocational education encompasses the development of shaping competence and demands didactic action to this end. The basis of vocational action and shaping competence therefore is work-process knowledge. U.S. labour scientists, who have been researching work-process knowledge since the 1970s, have commented on the importance of this knowledge and its exploration: if it is possible to gain access to the knowledge embodied in practical work, these findings will have an almost revolutionary impact, especially on curriculum research and curriculum development (Dreyfus & Dreyfus 1986; Schön 1983; Spöttl et al. 2020).

Acquiring experience or experiential knowledge in the appropriate processing of work tasks is something that is taken for granted; it occurs quasi automatically. Action knowledge is sufficient to carry out a task. As a basic rule, the acquisition of this experience is already based on elementary theoretical prior knowledge in the form of technical knowledge. However, work-process knowledge is more, it develops on comprehending knowledge. This knowledge provides an answer (in the professional context) to the question: Why is or does a thing behave in such a way and not differently? Answering this question, provoked by the different demands placed on work and technology, presupposes the reconstruction of the (historical) development as well as the interests, purposes, and norms associated with a thing. It is about systematic reconstruction and reasoning – and not about pure experience. However, experience is at the same time the prerequisite for comprehending cognition. This, in turn, forms the basis for action-guiding knowledge and the gathering of new experiences in the process of professional action.

Work-process-related knowledge points beyond the action situation at the workplace to operational contexts and processes and, accordingly, to contextual knowledge. Experience and work-process knowledge are promoted above all when learners are confronted with new situations, with errors and their corrections, with decision-making processes as well as with innovations at the focal points of operational organizational development. Work-process

knowledge that only aims at the reproduction of existing knowledge is not very innovative and at best enables the reproduction of existing facts. Only work-process knowledge, which includes the experience that arises from operational innovations and from overcoming problems, establishes professional shaping competence.

Work-process knowledge is the pivotal point for logically shaped vocational education and the respective curricula. All knowledge incorporated in this approach excels with much higher stability than "technological knowledge" which can be assigned to the surface of the technological development. In his essay "From work experience to work-process knowledge", Fischer has comprehensively and systematically developed the term work-process knowledge as a scientific and vocational education category and has thus considerably contributed to an identification of logical structures of development in vocational education (Fischer 2000). The term "work-process knowledge" describes the knowledge of skilled workers which is, to a great extent, acquired by individual work experience (see Figure 2). In this complex, the following characteristics have been specified with respect to the range of the term "experience":

- Work-process knowledge combines theoretical knowledge and practical experience in a systematic rather than in an accidental way.
- Work-process knowledge is oriented towards the entire work and business processes of a company and is not just confined to work experience at the workplace.
- Work-process knowledge is accumulated in situations calling for tasks such as targeting, planning, execution and assessment of one's own work.
- Work and business process knowledge unfolds in problem situations, above all at crystallization points of corporate decision making, e.g. with the introduction of new technology or with the decisive change of existing work-processes within the framework of operational innovation processes (Spöttl et al. 2020).

The concept of work-process knowledge in this form goes beyond the concept of step by step development towards an expert as described by Dreyfus & Dreyfus (1986).It underlines the interaction between experience and systematic knowledge more forcefully. Furthermore, work-process knowledge is not confined to the organizational dimension of operational processes and the respective overall knowledge; it also encompasses the practical, implicit, and theoretical knowledge incorporated in concrete vocational work. Work-process knowledge can therefore be characterized as a holistic concept of knowledge because practical, rational, aesthetical, and social moments form a unity within work experience.

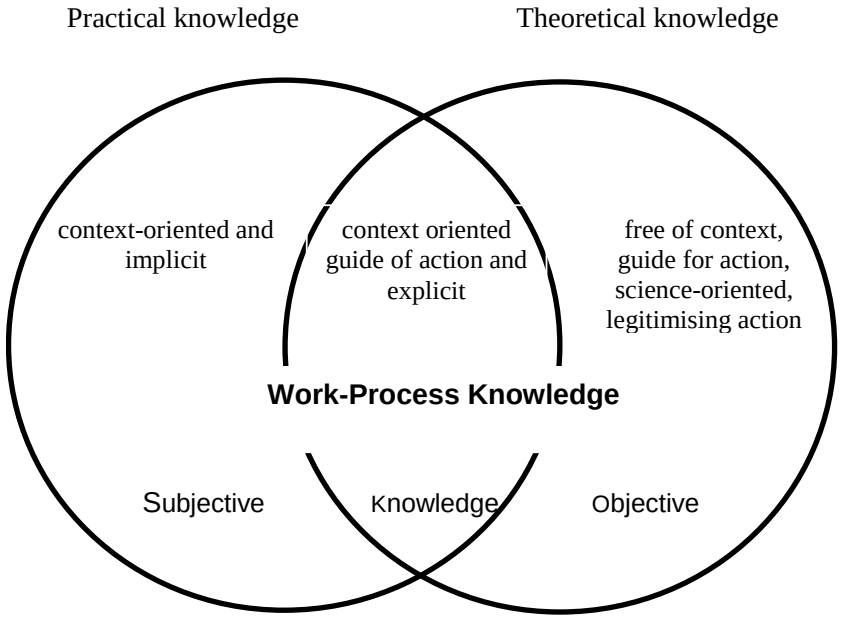

Figure 2: Dimensions of Work-process knowledge (Spöttl & Loose 2018, 7)

The work-process oriented concept of the development of competence is highly suitable for curriculum development as it supports the formulation of contents from the perspective of work-process categories (Kleiner 2004). The model does not start from the prevailing differentiation of formalized knowledge, but aims at a qualitative reorganization of thinking "from standard-guided 'know-that' to experience based 'know-how'" (Dreyfus & Dreyfus 1986, 41). Competences and expert knowledge should be developed which are both organized in a way which is qualitatively different from explicit standard knowledge. The most important links are the real challenges of work, technology, and society. This aspect demonstrates the difference of this concept compared to models which rely on a defined "spectrum" of entry competences and then try to develop "final competences" – defined as "reflected masterful" – with the aid of differently shaped teaching and learning processes. These models operate within a defined framework and imply that the determined entry and final competences are both "correctly" assessed and that the applied teaching-learning processes initiate data processing procedures which produce the expected "knowledge" and develop the defined competences (Spöttl et al. 2020). However, what is often ignored is the fact that the entire learning process is confined to a given framework which can firstly only be tied in with the known subject structures (due to definitions) and, secondly, completely ignores the complexity of the "real world" of skilled workers and engineers.

The advantage of approaches as described above may be summarized as follows:

- Work-process based learning is focused on competence development.

- Coping with work requirements is used as a driver and it is embedded into the social procedure of a re-shaping of work organization and the further development of a company.
- Learning during the work-process is amended by various functions and thus clearly goes beyond the production of new knowledge and skills.
- Work-process orientation supports cognitive flexibility as well as networked thinking. The acquisition of competences takes place in realistic context situations and with strong participation of the student. Self-guided and self-organized learning will thus play a major role.
- Learning and working can be easier integrated by work-process orientation.
- Work-process-based learning helps to close the gap between employees who are often attending further training courses and those who do not or only rarely have this opportunity. More or less all employees of a company can be involved in these development processes.

2.3 Character of work-process-based learning

The previous explanations on learning and working indicate that the forms and contents of learning in companies are obviously changing. Work-process related learning is becoming a main issue to tackle for the companies. This is flanked by informal forms of learning, self-directed learning with digital media, product training and others. It is therefore appropriate to characterize the development of work-based learning.

As Raelin puts it, it has become a veritable necessity in work-based learning, that learners adopt the capacity to deal with change and with the future (Raelin 2008, 71). However, the competence development of the learner cannot be limited to professional competence, meaning the willingness and ability to solve tasks and problems in a goal-oriented, appropriate and autonomous manner which (partly) could be practiced and simulated in TVET schools. Nonetheless, it needs to be taken into consideration that real work-processes require skills and competences in terms of working with other people to achieve a shared goal as well as reflect on the consequences of their own actions and behaviours throughout a real working process. This is not something which can be artificially created. “It becomes obvious that technical know-how is not sufficient on its own. Instead, both learning venues are set up to help trainees develop vocational action competence. In order to achieve this goal, different stakeholders are involved in shaping the key elements of the dual VET system, including the continuing development of system standards and implementation, assessment and certification and the two responsible learning venues” (Pinnow 2019, 4) – thereby strongly emphasizing the aspect of practical application.

Work-based learning is one crucial aspect for an individual’s continuous development to maintain his or her employability due to the changes in the world of work as outlined above. At the same time, companies are reorganizing their workplaces and production structures in order to use the manifold opportunities offered by work-based learning. In those terms, work-process based learning (WPBL) becomes increasingly important since it places emphasis on

the workplace as offering multiple opportunities for learning and stresses that reflection in particular “constitutes the ability to uncover and make explicit to oneself what one has planned, observed, or achieved in practice. It is concerned with the reconstruction of meaning” and therefore “is fundamental to all work-based learning practices” (Raelin 2008, 74).

Shaping structures in the workplace also plays an important role as it has a major influence on the transfer and management of knowledge. In other words, when the learning content of work-processes is taken into account, WPBL can “serve as an engine for transforming an organization to be receptive to learning” (ibid., 33). If the overview of the knowledge inherent in an organization is available, it is possible to think about ways of dissemination for this knowledge base to colleagues. Finally, the transferred knowledge has to be “assimilated” to be available for further action and for applying your (new) knowledge to new (work) situations. Knowledge management represents in this situation a more abstract level regarding questions of how to conduct a working place (at the company) in way that supports learning. At the same time, it also touches on the question of specific criteria which are supportive for learning.

3 Criteria for conducting work-processes-based learning

In the following, criteria for competence-promoting work design are discussed in more detail. From the TVET perspective, there are initially two central strands to the discussion:

- On the one hand, there is the question of how to shape framework conditions that promote learning and competence development. The focus here is on the learning theory approach.
- On the other hand, specific criteria for the shaping of work-processes have to be considered.

The first perspective is oriented towards the goal of promoting professional competence as a holistic concept in terms of competence orientation, while the second perspective emphasizes the claim of vocational pedagogy, which in the sense of "modern" professionalism aims at the development of comprehensive professional competence, both in dual training and in university studies (IG Metall Executive Board 2014). It refers to the co-design of work, work organization and technology and thus the task assignments.

3.1 Levels and characteristics of arranging learning in the context of work

In the context of acknowledging workplaces as learning venues, additionally to the subjective characteristics that are inherited with the working persons themselves, objective factors that refer to the work-process or place of work itself are increasingly being considered. This always raises the question of the learning-infrastructural enrichment of the workplace and the work activity, i.e. the operational framework conditions (Salman 2008, 88).

These are concretized at the macro level (i.e., the level at which a company is viewed as an overall system) in the corporate culture and working conditions. Work-process-oriented learning in the company thus takes place within company contexts of action (at various levels) and is thus also determined by work-cultural and organizational-structural conditional factors (ibid.). Therefore, a corporate culture is required in which the continuous (further) development of individual competences and the establishment of knowledge management structures is an essential feature of the corporate philosophy. According to results of the Federal Institute for Occupational Safety and Health, leadership behaviour is directed towards balanced, challenging work and learning promotion (Richter, Ribbat, & Mühlenbrock 2020, 18). In this context, Frieling and Reuther (1993 cited in Salman 2008, 89) refer to concrete mechanisms that can support a corporate culture conducive to learning and competence:

- Creating opportunities for internal networking, cooperation and self-regulation in groups,
- Process orientation and strong participation of employees in the shaping of work processes and distribution of tasks
- Flat hierarchies, democratic and participative management style
- Support for new ideas and reward for commitment
- Tolerance of mistakes in risky projects
- Integration of personnel and organizational development
- Functioning information communication systems (excerpt, Salman 2008, 89).

At the meso level (e.g. the department or work group, within a community of practice), it is primarily a matter of fundamental characteristics for the shaping of work conducive to learning and competence, or more precisely, concrete task characteristics and work requirements. Against the background of learning theory, Salman (2008, 91) refers to the relevance of action regulation theory, or Hacker's concept of complete action (Hacker 1973). A complete action consists of informing, planning, deciding, executing, controlling and evaluating. Since feedback on the achievement of goals is integrated, the complete action not only enables a continuous flow of information, but also a development of competences. In the light of the assumption that learning processes take place between anticipation and reflection, learn and work assignments constructed according to this model promote the ability to complete (company) work assignments and challenges independently, self-critically, and responsibly (BIBB n.d. (a); Spöttl et al. 2021).

Dehnbostel (2007, 67) emphasizes seven dimensions in the context of a learning and competence-promoting work design, which are of importance for the shaping of corresponding learning framework conditions, taking into account the overarching objective of acquiring reflexive action competence:

- As a consequence, he affirms the relevance of the concept of *complete action* and refers to the fact that employees should be confronted with requirements [...] that call for the application of as many work actions as possible required in the sense of a "complete action" (ibid.).

- Furthermore, reference is made to the objective degrees of freedom and decision-making in the execution of the respective work task. In this context, Dehnbostel speaks of the necessity of a certain *scope for action*, which in turn is significantly dependent on the respective corporate culture. This requires the participation of those acting in the respective planning processes (ibid., 69).
- The *experiences of problems and complexity* are clearly related to the respective scope of action. Consequently, as the scope and complexity of a work task grows, so does the potential for agents to gain problem and complexity experiences. This requires, among other things, work situations that are characterized by indeterminacy, the interconnectivity of the variety of tasks, and the pursuit of multiple goals (ibid., 68).
- Another dimension that promotes learning and competence is *social support or colleagueship*. Dehnbostel elaborates that colleagueship and communication play a central role in stimulating and assisting employees to interact with one another. In this course, cooperative learning formats can generate a high degree of collectivity, communication, stimulation and formal as well as informal (group) learning processes. It “transforms learning from an individual to a … process, with collective learning processes constituted by individual learning processes and a feedback effect” (ibid.).
- With regard to the *individual development* of the agents, it is of particular importance that the task is aligned with their stage of development. In detail, this means that it enables the employees to develop individual ways of working. In concrete terms, this involves ensuring maximum self-control of the action without over or sub-challenging the actors (ibid.).
- Furthermore, in addition to individual development, the *development of professionalism* in work is an essential criterion that promotes learning and competence. This is understood to mean the successive improvement of the individual's professional ability to act through the development of successful action strategies. Through feedback processes and experience, the professional ability to act can be strengthened step by step (ibid.).
- Following on from this, structural reflexivity as well as self-reflexivity represents another key structural characteristic called *Reflexivity*: "Reflexivity at work means reflecting on work structures and environments as well as on oneself" (ibid.). This essentially means the conscious and critical evaluation of actions based on one's own experience and knowledge.

Thus a competence-promoting work-process requires the possibility of processing in the sense of a complete action, scope for active reflection processes and opportunities for social learning or the exhaustion of social support systems in the work as a framework condition. These described dimensions shift the learner’s self-control into the focus of competence development. However, they are not to be interpreted as unquestionable quality criteria of a learning theory perspective on the shaping of work-processes but are to a large extent linked to the structural conditions in the company. On the other hand, their effect also depends on the individual's level of development (ibid., 69).

Furthermore, aspects of heterogeneity and a new role for trainers can be derived as central determinants of a work design that promotes competence and learning (Hoepfner & Koch n.d.). *Heterogeneity and diversity* are to be understood as an opportunity for vocational education and training and for securing a sustainably skilled workforce.

From a general perspective, this is reflected and recognizable by initiatives e.g. by UNESCO. The issues of diversity and cultural variety are discussed worldwide as a challenge for educational and cultural policy. Symposia, international networks and the support and advice for specific activities for cultural education by UNESCO outline a broadened view on the demands of education (UNESCO 2021). Learners are therefore to be taken into account with their different prior knowledge, different learning and receptive abilities or motivational and interest situations. In this context, individualization as a regulative idea also plays a key role in in-company training work. Consequently, there is a need for a holistic view of learners and (further) educational processes that are explicitly linked to the development of the personality and participation in society and working life (Lippegaus-Grünau 2014, 3). From a more specific company perspective, diversity management as a concept is aiming to cope with personal diversity within the company as a part of human resource management. In this context, individual differences of the employees are emphasised in the sense of positive appreciation. The overarching objective is,

- developing and supporting a productive overall atmosphere and culture in the company;
- prevent discrimination against minorities;
- improve or rather enable equality of opportunities (BIBB 2014, 15).

These change goes hand in hand with a broader role for TVET teachers and in-company trainers. Accordingly, training staff must be specifically prepared and qualified for the new requirements. There is a need for strategies of diversity management in order to handle challenges with respect to heterogeneity and diversity in in-company vocational training. Companies have to be aware of aspects of heterogeneity and be specifically supported and accompanied in the process of recruiting and training of young people (ibid.).

Additionally, the digital transformation of work and the accompanying changes in production conditions also demand a new understanding of the role of training personnel. They are no longer in the traditional role of purely imparting knowledge, but are increasingly assuming an organizing, initiating and advising position. They should enable active and self-directed acquisition of competences on the basis of action and process-oriented didactics and methodology (BIBB n.d. (b), 3; Spoettl et al. 2021). Communication between trainer and learner at the same level and an associated appreciative basic attitude are regarded as essential elements here.

3.2 Learn and work assignments and criteria conducive to action orientation

As for the question of explicit options for the shaping of work-process-related learning, the outlined levels and criteria conducive to learning focus on three approaches which seem particularly suitable for taking the requirements described into account and for joining them in an introductory thought for didactic design. These are, on the one hand, the *concept of a learn and work assignment* (emphasizing here the learning claim and the conscious shaping by teaching staff without going into the comprehensive discussions of learn and work tasks at this point (Schröder 2004), the differentiation of *work-process knowledge in reference to competence levels* as well as in didactic design features referring here to the *process level of an activity-based and self-reliant approach* (Hoepfner & Koch n.d.).

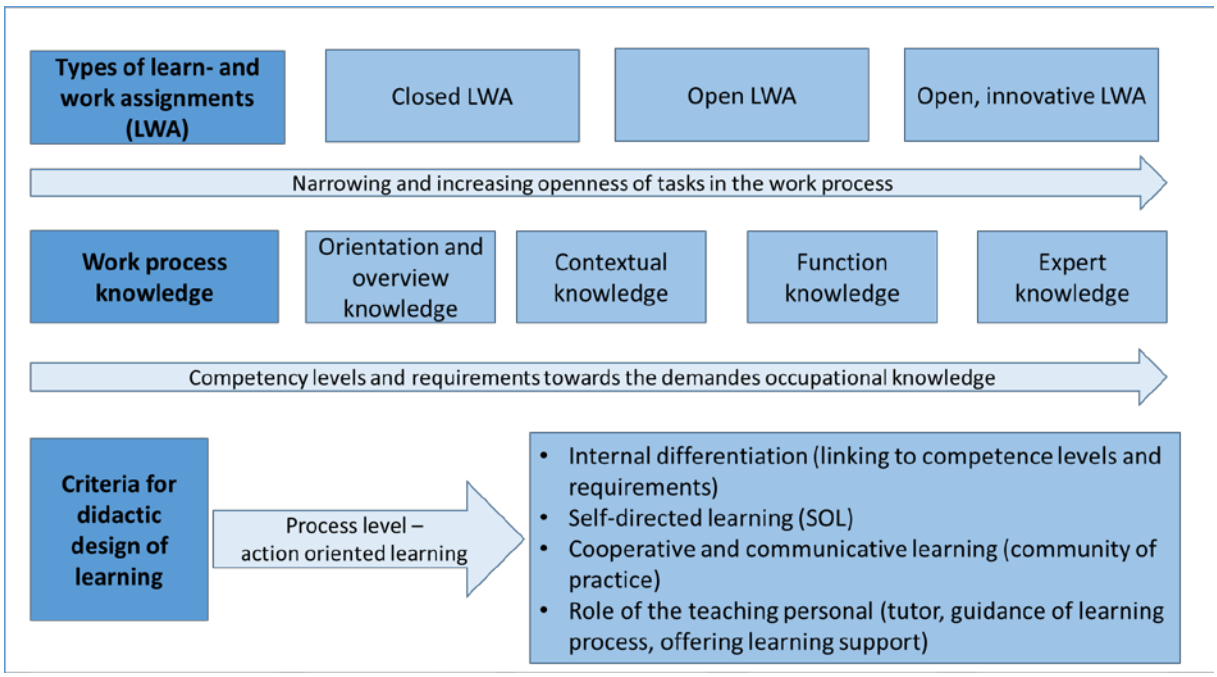

Figure 3: Shaping levels and criteria conducive to learning in the work-process

Figure 3 depicts that, in terms of the organization of the learning process, different degrees of freedom in the task ("types of LWA") go hand in hand with different requirements for the subject contents and the competence levels to be addressed (level of work-process knowledge). Finally, there are four central elements on the didactic level of shaping the process for the teaching staff.

3.2.1 The concept of learn and work assignments

In the approach of learn and work assignments, the focus is on typical tasks of real work-processes. Based on the content and requirements, learn and work assignments support the process of competence development, especially through the objectives and demands of supporting activity-based and self-reliant learning. Furthermore, in the context of enhancing cooperation between learning places, learn and work assignments are an elementary

instrument. "Learning in the work process" with the shaping of learn and work assignments, goes one step further. Here, the company workplace is accessed as a place of learning under the company's working conditions. The vocational scientific research approach (Becker & Spöttl 2015) lays a foundation in this regard. It pursues the goal of "identifying the tasks characteristic of an occupation and the qualification requirements incorporated in them and investigating the didactic significance of these tasks for competence development" (Becker & Spöttl 2015, 27). The complexity and holistic nature of operational work tasks and processes are captured with a view to "the objects of work, methods, tools, forms of organization and requirements for skilled workers from within (the company) and from outside (requirements of society, the state, etc.) in terms of their significance for the subject (ibid., 105).

3.2.2 Work-process knowledge in relevance of competence levels

The level of work-process knowledge and its significance in relation to experiential knowledge and the development of vocational action competence are presented here in relation to different levels, as these describe different types of learning or requirements with reference to the work-process (Becker & Spöttl 2008; Neuweg 2001).

The *first level* is characterized by contents concerning an *orientation and overview knowledge*. A beginner (trainee) learns what constitutes the principle contents of the work-process. Learning has a direct contextual reference and is characterized by generally valid and thus action-guiding "rules" that can be applied in the work-process. The complexity of the work reality is thus generally reduced, but at the same time the basis for further learning steps is created.

The *next level* involves what is known as "*contextual knowledge*". This describes facts, action routines, recurring patterns or specifications in the form of guidelines. The contents of these levels are characterized by experiential knowledge, combined with concrete application situations that are more comprehensive in their complexity than at the first level and which already show connections to upstream or downstream steps of one's own action in relation to the holistic work-process.

At the *third level*, the learner already *thinks and acts in complex problem solutions* for the current work situation. The learner is able to carry out the problem solution based on theory and at the same time takes into account the extensively acquired experiential knowledge. This action is comparable to an algorithm, where goals and procedures are developed and also weighted or evaluated differently (as a key developmental characteristic compared to the previous stage).

At the *fourth level*, the learning person can already be considered an expert in his or her own field of work. The learner’s own technical work can be explained systematically. Likewise, extensive as well as novel work situations are to be mastered by the person through corresponding *problem-solving processes and transfer activities*. At this level, the procedure often appears rather intuitive, as the experiential knowledge no longer needs to be explained. Due to the number of work and learning situations already experienced in the three previous

levels, a development of competence can be recognized on the basis of which the person is able to select his or her procedure almost immediately and, as a rule, auspiciously.

3.2.3 Action-oriented shaping criteria on the process level

Within the so-called process level of (action-oriented) learning, the following suggestions and ideas are relevant to the discussion about shaping criteria (Riedl 2011):

An *internal differentiation* must be taken into account for trainees and skilled workers in heterogeneous levels of prior knowledge, skills, motivation and interests. In order to meet the requirements of the work-process as adequately as possible for all employees, options of differentiation are necessary (comparable to the didactic challenge, e.g. in vocational school lessons). By shaping and planning work-processes and the organization of work, skilled workers can be positioned in relation to the respective level of competence development. In this context, working time, learning time and pace can also vary. The differentiation of the levels of work-process knowledge (cf. Figure 3) shows how this differentiation is to be technically designed.

For the completion of open tasks or problem situations, repetitive thinking is not sufficient for the learners. In order to be able to cope with the complex tasks of action-oriented teaching, learners need far-reaching degrees of freedom in the choice of work paths, work materials and work cooperation, which are reflected in the *self-direction of learning* and the necessary *degrees of freedom*. In order to enable these degrees of freedom, it is essential that the objective of the work-process can be reached in different ways. A major challenge in the shaping of action-oriented learning is the balance between the least possible restriction of the learners' scope for decision-making and a certain degree of guidance. Too much restriction of the decision-making scope leads to a reduction of self-direction and can thus be an obstacle for the individual construction of new knowledge, whereas too little guidance in the learning process can lead to inefficiency and loss of motivation on the part of the learners.

A further aspect can be described as *cooperative and communicative learning*: Working in groups offers the option that multidimensional interpretations or solutions can be found for coping with tasks. The initiative and independent organization of work within groups (as it is also required in the context of school learning processes and can also be adapted for work-related learning, Riedl 2011) promotes important competences such as team and communication skills. Intentional group composition (without being forced to) increases intrinsic motivation and tends to form performance-homogeneous groups which lead to an equal distribution of tasks and workload within the group – which then establishes itself as a community of practice (Hupfer 2019).

Looking at activity-based or self-reliant learning (also following the promotion of action orientation in the vocational school context), the teaching staff is not responsible for the dominant transfer of knowledge, but rather plays the role of organizing, initiating and advising during the work or learning process (Spöttl et al. 2021). The teacher takes a back seat, providing specific and helpful impulses and supports the learning process.

4 Conclusion

4.1 Didactic concretization of a work process-based concept of competence development

The corporate and social development processes and the challenges of the requirements as outlined propose a didactical concept which helps to develop motivating learning structures in the context of corporate processes – i.e. work-processes. In order to comply with the qualification interests of companies and the subjective educational needs of employees and apprentices, it is recommended to adopt an orientation of the didactic concept to the idea of co-shaping of the world of work with a view to economic, technological and ecological criteria, as well as to issues such as health care and a shaping of work that encourages learning. The following didactic model should therefore characterize work-process-based learning:

Order orientation: "Order orientation" describes a didactic principle where the occupational learning process is oriented to Learn and Work assignments. The objective is:

- to sensitize the employees' conscientiousness for customer oriented quality work,
- to strengthen responsibility for the occupation of all persons involved and
- to acquire knowledge and occupational competence of action in the entire context of real and authentic situations (imparting learning with good sense).

Work-process-oriented learning is highly suitable for smaller enterprises. It can be integrated into work-processes that are shaped in a way to encourage learning. Nevertheless, this may not be reduced to mere adaptation training. This would entail both administrative and economic disadvantages, as the measure does not yield competent skilled workers and would entails long-term costs for frequent refresher courses.

Acting-based learning / self-reliant learning: Provided that further training measures are not only carried out in the learning environment "company" and that learning is not organized in such a way as to encourage learning during the work-process, the overall didactic principles of action and self-reliance are validated. The identification of occupationally relevant learning requirements should be linked with work-processes and shaped to encourage the active engagement of the students. Possibilities range from (co)formulation of requirements, the (co)shaping of project objectives, autonomous and cooperative work on the project up to the evaluation of the possible different project results. Employees of companies should be involved in the reflections on the chances for learning and the progress of their qualification. The latter calls for the development of adequate examination methods that help to diagnose qualification deficits within the occupational learning process of the training institutions, companies and students.

Shaping orientation: Shaping competence in employees is increasingly in demand for occupational practice (recycling-friendly shaping!). Imparting such competences means confronting students in time with technological and corporate acting and shaping spaces – increasingly available in corporate organization development. Two didactic guiding

principles support teachers and students in the creation of a shaping-oriented qualification process:

- Why are technology and work (corporate practice) what they are?
- Is there another way?

Both questions aim at the qualification for corporate innovations by taking into consideration corporate quality and shaping circles. Shaping-oriented further training therefore does not reduce a learning task to defined specifications with a correct and a wrong solution but to a relevant, open type of problem which also allows the discussion of the question of an adequate solution. This is the only way to compare approaches to reach a solution, criteria for a solution and evaluation standards, and to evaluate the project results properly. Realistic learning tasks therefore promote the shaping competence of students.

Contents for competence development measures: The contents for competence development measures can thus no longer be derived from the specialized systematics of the existing sciences. Even topic-related emphasis on the planning of training measures clearly loses importance. The work-process is at the centre of interest. Business and work-processes include the acquisition of the material, its disposition, transportation, storage, dismantling, and handling, through to marketing.

For the further development of competence elements, it is important to focus on special knowledge in an overall context. This is true for both occupational-specialized systematic basics and background knowledge and the context of a business process or a corporate organization process and their interaction with concrete work-processes.

Work-process contents, on the other hand, form the basis for the creation of LWA. Different types of LWA are key to supporting further training. A specification and at the same time a multi-dimension reflection of the requirements given by the LWAs can be done by adding further dimensions to traditional concepts for initial and further training which are just oriented to the “object of technology”.

4.2 Further research desiderata and future outlook

The discussion of different approaches to WBL presents itself as a complex and multi-perspective debate which differs mainly in the location (learning location company or educational institution) and in the proximity or distance of the approaches to the real work-process. Overall, the learning content of the work-process itself is no longer questioned and competence orientation is, depending on the international perspective, more or less clearly distinguished from activity-oriented task accomplishment (Spöttl & Tahir 2019). But all in all, following the theoretical approach-oriented presentation in this paper, there is a need to focus on and advance the concrete shaping of didactic criteria and research into the effectiveness of the didactic-methodical elements for the support of learning (in the company and school context). Two ways to do this can be outlined or taken up as suggestions:

- With regard to the approach of vocational research which focuses on an analysis of the work-process, it was considered among other things on a science-theoretical level, to

what extent the didactic principles according to Klafki (Klafki 1964; Grantz et al. 2013) show intersections or can serve as a basis for further development of the methodological research approach. Comparable thought games seem to make sense for the criteria of action-oriented teaching according to Riedl (2011), insofar as these can be related (as a transfer) to the support of learning in the work-process. The aim is to generate concrete application and implementation recommendations, backed up by empirical analysis through concrete research with reference to workplace and school learning or competence development with reference to work-process.

- In this regard, the authors will take up and evaluate specific aspects in a current, internationally oriented research project on work-based learning in Thailand in existing research collaborations. For example, in cooperation with the Rajamangala University of Technology Lanna (RMUTL) and the King Mongkut University of Technology North Bangkok (KMUTNB), further developments in vocational teacher training have been initiated in two projects in order to provide insights into real work-processes through practical phases and to integrate methodological examples of learning in the work-process into teacher training.

Results will be reported on this in a timely manner (in another TVET@Asia issue in 2022). The topic of WBL in connection with the vocational pedagogical objective of competence development will then be discussed further with best practice examples – and in doing so will contribute to the scientific discussion.

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