Work-oriented and competence-based Curriculum Design in the German Dual Vocational and Education System

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Abstract
A reform in 1996 introduced a work-centred and competence-based turn in the school-based component of dual vocational education and training in germany. The classic distinctions of "theory equals school-based learning" and "practical experience equals work-based learning in companies" are to be removed through the orientation of school-based content to the practical requirements of the vocational and professional work. In the article the underlying concept "areas of learning" is described and contrasted to the competence-based approach in general education.

Introduction
In Germany, the dual system of vocational education and training is carried out parallel in companies (normally 3 days a week) and in vocational schools (normally 2 days a week). There are statutory regulation documents for the goals, content and timetable structures for the vocational education and training at the two learning locations: The companies are governed by *training regulations*; the vocational schools by *framework curricula*.

Since the concept *areas of learning* (german = Lernfeld-Konzept) was introduced in 1996 as a structural principle for the framework curricula, the requirements for vocational education in schools had to be redefined. The reform ended up being much less of an evolution rather than a revolution. The reform had wide-ranging consequences not only on the course and lesson design, but also on the organisational framework conditions of the schools, the cooperation between schools and companies and the required qualification profile of the teachers.

In the school-based vocational education, the reform removed the concept of subjects and replaced them with areas of learning. Since the mid-1990s and the introduction of the new concept, vocational education has experienced a work-oriented and competence-based turn. Its intended direction is an approximation of school-based learning to conditions within the marketplace. Various theories and development trends were taken up in this regard, such as action-theoretical approaches (Aebli 1980), the process-orientation of Lean Management (Womack et al. 1994) or other reflections on situated knowledge and learning (Lave 1988; Lave and Wenger 1991).

The competence turn occurred one decade later and in the opposite direction within general education: an approximation of school-based learning to the systematics of the reference disciplines. These two differing directions are described in the following chapter.

Concepts of Competence-Based Education
There are today different approaches to competence-based education within the general educational schooling system and vocational education and training system in Germany. The emergence of these differing concepts, their differing backgrounds and diverging understanding of concepts are demonstrated in the following two subchapters.

Work-Orientation versus Science-Orientation

The discussion about whether vocational education in vocational schools required a new foundation initially started in Germany in the 1980s. The competence-based turn in vocational education finally took place in the 1990s. Since 1991, the ultimate goal of vocational education has been "competence to act". This ultimate goal led to the formulation of an action-oriented education as a didactic guiding principle (KMK 1991). Then came the curricula change in 1996; until 1996 all content matter at vocational schools had been taught systematically. Since 1996, the content matter is no longer oriented to the reference disciplines (e.g. engineering), but to the actual work requirements (KMK 1996/1999). In future, trainees should learn how to master vocational and professional challenges also within the school setting. The classic distinctions of "theory equals school-based learning" and "practical experience equals work-based learning in companies" or "knowledge equals school-based learning" and "know-how equals work-based learning in companies" are to be removed through the orientation of school-based content to the practical requirements of the vocational and professional work. It is no longer the inputs (useful knowledge), but rather the outputs (holistic vocational activities structured into areas of learning) that are defined. The reform introduced a work-centred turn in the school-based component of dual vocational education and training. The reform was triggered during the 1980s by companies' heavy criticisms of the school-based education as useless for the work requirements and the needs of the companies.

The reforms in the general education systems, on the other hand, were targeted at strengthening the scientific principles (PISA-Approach of OECD): "Subjects taught correspond with scientific disciplines that develop particular world views (historic, literary-cultural, scientific etc.), while introducing particular 'codes' (e.g. mathematical models, hermeneutic text interpretation)." (Klieme et al. 2003, p. 18, translated from german by the author). In the 2000s, especially representatives of educational psychology and subject didactics in general education, design competence models with structural models on the one hand and level stage models on the other, oriented by traditional profiles (including linguistic/literary, mathematical/scientific, historic/social and aesthetic/expressive). Common to both paths is that the outcomes are placed in the fore. How the two education systems are managed (vocational education and general education) is oriented towards the question of what somebody should ultimately be able to do. The important difference between the two is what guiding paradigm their competence is based on.

- Science, systematic and subject orientation in general education: In order to apply and transfer knowledge, it must be ordered systematically and should therefore be taught and learned systematically. Developing this systematic behaviour is the key role within the scientific discipline and subject didactics. The teachers' responsibility is to solidify the subject-structured content (e.g. mathematics, physics) in class using various social applications (e.g. "You would like to conclude a mobile phone contract...").
- Work, situation and action orientation in the dual VET-System: In order to apply and transfer knowledge, it should be situated and should therefore be taught and learned using situated vocational and professional problems. The professional problems are provided using operational requirements, or a job's action logic (where action logic is expressed in actual business and work processes). The responsibility of the teachers at the schools is to incorporate the vocational and professional problems indicated on the framework curriculum into learning situations for class (e.g. for the career of Electronics Technician: "You would like to install a satellite dish at a private household...").

The challenges can vary accordingly: while, for instance, mathematics is basically identical across cultural borders (and is therefore particularly suited for international OECD comparisons), vocational and professional skills are no unitary dimension, but are always dependent on the relevant cultural, political,

organisational and situational requirements. Accordingly, a comprehensive definition of competence is needed in vocational education and training, which considers not only the technical competence, but also the social and personal (self) competence. In this context, mathematical competence is just a subsegment of technical competence and may, for instance, be mostly useless without know-how and social and personal competence in work-related situations (e.g. "How would I justify a decision to a customer?"). However, mathematical competence is a standalone competence in the general education that can be structured (e.g. mathematical argumentation, mathematical modelling, mathematical representations) and scaled (e.g. reproduction, generalisation, reflection).

Table 1 illustrates as an overview of the key differences between competence-based education in the general education and in the dual system of vocational education and training (see also Sloane and Dilger 2005).

Table 1: Competence-based education in general and vocational education

	Competence-Based Orientation in	
Characteristic	**Vocational Education**	**General education**
Principle of control (old)	Input orientation	Input orientation
	Purpose in schools: Acquisition of systematic knowledge	Purpose in schools: Acquisition of systematic knowledge
Trigger	Criticism by the industry: The school-based vocational education does not contribute to meeting vocational and professional challenges, but only provides abstract and useless knowledge.	PISA comparison study by OECD: Performance by German pupils is only average when compared internationally.
Begin	1990	2000
Principle of control (new)	Outcome orientation	Outcome orientation
	Purpose: Meeting vocational and professional challenges	Purpose: Meeting subject challenges
Guiding paradigm	Vocation and work	Science and subject
	Situated	Systematic
Competence	Competence = Integration of differing skills and abilities in order to perform successfully within a specific domain	Competencies = Sum of various cognitive abilities with different qualitative levels in order to solve problems in a specific domain
Domain	Definable vocational sphere of activity (e.g. mechatronics).	Subjects (e.g. mathematics)

The German dual system of vocational education and training enjoys great international esteem, as this system is obviously both capable of achieving societal goals (for instance a low unemployment rate) and economic goals (e.g. high economic power) according to the OECD (2010). These findings were made by the OECD, in other words, an organisation supporting a concept of competence not shared by the dual system of vocational training and education in Germany.

Competence to act versus cognitive competencies

In order to clarify the difference between the (reduced) concept of competence in general education

(PISA-Approach of OECD) and the (extended) concept of competence in vocational education and training, initially one should outline the concept of competence in general education (here in Germany).

Cognitive competencies as the key concept of general education

The normative foundations for reforms and competence-based education in the general education system were laid out in 2003 in the expert opinion "to develop national education standards" (Klieme et al. 2003). Its logic consists of the following:

1. Educational goals (Bildungsziele) are only generally-accepted statements and only reflect general expectations. They must therefore be put in concrete terms using competence requirements (Klieme et al. 2003, p. 20).
2. As part of a second step, Franz E. Weinert's comprehensive definition of the competence concept is used (ibid., p. 21 and p. 72), wherein competences are understood as "the cognitive abilities and skills that individuals possess or can learn for solving specific problems, and the associated motivational, volitional and social readiness and abilities that enable them to use these solutions responsibly and successfully in a variety of situations." (Weinert 2001, pp. 27-28, translated from german by the author).
3. The next step introduces the premise of domains; here domains are placed on a level with subjects. A distinction is than drawn then between "subjects" and "non-subjects" (personal and social competence) that are afterwards declassified as formless "cross-disciplinary competences": "Research would indicate that the development of cross-disciplinary competences assumes that extensive subject-based competences must already be in place." (Klieme et al. 2003, p. 75, translated from german by the author).
4. Following this division and categorisation, the conclusion is drawn that the formulation and the operationalisation of the competence concept ought to occur *subject*-specific and that it would therefore be the responsibility of science-oriented subject didactics to define competence models (ibid., p. 75).

Which logic is being applied here? The board is initially wiped clean. The arduous concept of "Bildung" is rejected. Which understanding is thereby being pushed aside? The German Committee for Education (Deutsche Ausschuss für das Erziehungs- und Bildungswesen) used to define "Bildung" in the 1960s as follows: "Being educated means you are constantly attempting to better understand yourself, society and the world around you ... it is not the brain that is educated, but the whole person. ... education rests considerably on an individual's own experiences ... Being educated means listening and the ability to participate in discussion. … education is the ability to independently perform critique and critical trust" (Bohnenkamp et al. 1966, pp. 870-873).

The blank board is now refilled with Weinert's definition. "In accordance with Weinert, with competences we understand ..." (Klieme et al. 2003, p. 72, translated from german by the author). Nonetheless, Weinert's definition is also too wide-sweeping (in other words, social readiness and skills, responsible use of one's abilities), which is why it needs to be reduced further to make it one-dimensional measurable. At the end, only a fraction of Weinert's comprehensive understanding of competence remains: "Competence" equals "specialised competence", with the word specialism referring to a domain, and domain being a teaching subject. The authors of the expert opinion "to develop national education standards" therefore draw explicit a distinction to the comprensive understanding of competence: "The concept of competences used here should be distinguished from the concepts that hail from vocational education and training and are frequently also used in public for technical, methodological, social and personal competence." (Klieme et al. 2003, p. 22, translated from german by the author).

Competence to act as the key concept of vocational education and training

On 14th and 15th March 1991, the Standing Conference of the Ministers of Education and Cultural Affairs (KMK) passed a framework agreement for the vocational schools: Vocational school provides a vocational basic and specialised education and thereby extends the previously acquired general education. This should enable a person to fulfil their challenges in the workplace as well as participate in shaping the working environment and society around them with social and environmental responsibility. Vocational school aims to provide the vocational skills by combining technical competence with general competence such as human and social competence (KMK 1991; see also Rauner 1988). The triad of competences mentioned in the previous quote, technical competence, human competence and social competence, has a long tradition in Germany (Roth 1971). Before introduction of the concept areas of learning, it already formed a central basic idea within vocational education and training. This concept was seized up again within the areas of learning concept and summarised with the term "competence to act": Part of the vocational school's aim is to impart vocational competence to act and extend the general education (KMK 2011). Competence to act comprises the dimensions of specialised technical competence, self-competence and social competence. On one hand, these dimensions are dependent, interconnected and cannot be developed independent of one another. On the other hand, these dimensions provide reference points and can be considered separately in order to pay attention that the three dimensions are demonstrated sufficiently. The three competence dimensions of competence to act can be defined as follows (Bader and Müller 2002):

- *Technical competence* is the ability and readiness to handle tasks independently, technically correctly, and finally assess the outcome. This also involves extrafunctional skills such as logical, analytical, abstract, integrated reasoning as well as the recognition of interconnected systems and processes. Regarding the training regulations for vocational education and training, corresponding specialist competence corresponds with the objective of enabling the performance of a vocation that involves independent planning, implementation and monitoring in particular.
- *Self-competence* describes the ability and readiness of a person to clarify, reflect on and assess for themselves the developmental opportunities, requirements and restrictions of work, family and public life, develop their own talents as well as conceive and develop their own life plans. Among others, this also entails developing well thought-out moral values and a self-determined commitment to specific values.
- *Social competence* describes the ability and readiness to conceive and comprehend social relationships and interests, affection and tension as well as reason and communicate with other people rationally and responsibly. This also involves the development of social responsibility and solidarity.

The three dimensions are emphasised using three transverse types of competence. These three types of competence – communicative competence, methodological competence and learning competence – are not independent dimensions, but emphases within the three above mentioned dimensions. The three accentuating competences can be defined as follows (Bader and Müller 2002):

- *Communicative competence* refers to the ability and readiness to share with one another issues and feelings via verbal (spoken and written), formal (formulaic, visual...) languages, but also through non-verbal means (gesticulation and facial expression). This also encompasses the ability to perceive, understand and express one's own intentions and needs, and those of others. The objective is therefore to understand and shape communicative situations.
- *Methodological competence* describes the ability and readiness to proceed in a targeted and planned manner when handling vocational tasks and problems (e.g. when planning the process steps). Here

learned thinking methods, procedures and solution strategies are independently selected, applied and, where necessary, developed further in order to handle tasks and problems. Methodical work includes independent design and assessment, which require initiative and creativity.

- *Learning competence* is the ability and readiness to comprehend, evaluate and integrate into their thought processes information regarding specific issues and relationships independently as well as together with others. In terms of professional work, learning competence develops through the mental processing of technical illustrations (sketches, wiring diagrams, professional articles), as well as in the comprehension and interpretation of social relationships and actions found in documentation by certain groups (newspaper reports, magazine articles, films etc.). Importantly, learning competence also involves the ability and readiness to develop and use in their further development learning techniques and strategies within and going beyond the vocational area.

This comprehensive concept of competence forms the basis for the concept areas of learning and the work-centred turn in vocational education in the dual system of vocational education and training. From this basis, the next step is to consider the development of the concept of areas of learning in its historic setting.

Design principles of vocational curricula

A key question when developing curricula is to decide how to orient the objectives, content and methods and how to justify their relevancy. This justification is important, as every curriculum performs normative stipulations. Reetz (1984), in reference to Robinsohn (1967), identified three contexts of justification: the principles of personality, science and situation.

- The principle of personality ties to the personality to be developed and it orients the choice of content towards an educational objective or educational ideal. How is a person, how could and ought he be, and: how should he be? The key question here is by what norm this "should" should orient itself. According to the ideals of an emancipated individual, a Christian (or other religion), a competent person and/or a member of civil society?
- The scientific principle is oriented to the structure of the sciences (i.e. engineering, economics). The idea here being that the academics research and systematise an object or specific area, pass the content structured by subject to the teachers and the teachers in turn pass the material onto the pupils in pedagogically reduced form.
- The situation principle is oriented towards the current or future situations of those learning, e.g. family, work or free time. Initially, the learner has to identify current or future situations that require mastering. Following on, the required competences need to be ascertained and then, using these competences as guidelines, material content and learning tasks can be derived. The acquisition then takes place in reverse order: use the content and tasks to attain competences that can be used to handle situations.

Subsequently, the focus will be on the "situation principle". However, the situation principle does not stand alone, even if it is the focus of the following chapter. As represented in the previous chapter, much more is thought of a comprehensive competence concept that represents the personality principle.

During the 1980s, school-based education within the dual system of vocational education and training saw heavy criticisms. The industry's representatives particularly criticised that the school-based education was too theory-intensive and far from reality, not contributing towards tackling the challenges of working life in the industry. In other words: the schools were not oriented towards the customer (Hüster and Gravert 2001).

The new concept of "areas of learning" does not completely abolish the dominant scientific principle of the mid 1990s, but it did introduce the situational principle, and the concept included above all that the scientific principle starts to fulfil a kind of service provider function for the situational principle: "Areas of Learning are ... thematic units that are oriented towards vocational tasks and procedures. In special cases, thematic units can also be included within areas of learning from an academic point of view. In any case, even for such units the connection with the work process should be made clear. Conveying orientational knowledge, system-oriented thinking and action, solving complex and example tasks as well as networked thinking are promoted particularly within an action-oriented classroom. It is therefore indispensable that the respective work and business processes are provided with the relevant academic background information." (KMK 1996/1999, p. 14).

A mechanical engineer's (academically trained) task is to develop and construct machines. The task of a skilled worker (vocational trained), on the other hand, is to operate, maintain or repair machines. This demand manifests itself in the areas of learning structured framework curriculum of 2004 (Table 2).

Table 2: Framework curriculum for the recognised vocation of industrial mechanic

No.	Learning areas	Approximate time scales in hours			
		1st year	2nd year	3rd year	4th year
1	Production of components using hand-held tools	80			
2	Production of components using machines	80			
3	Manufacture of simple assemblies	80			
4	Maintenance of technical systems	80			
5	Production of parts using machine tools		80		
6	Installation and commissioning of control systems		60		
7	Fitting of technical subsystems		40		
8	Manufacture using numerically controlled machine tools		60		
9	Repair of technical systems		40		
10	Manufacture and commissioning of technical systems			80	
11	Monitoring product and process quality			60	
12	Maintenance of technical systems			60	
13	Ensuring the operation of automated systems			80	
14	Planning and implementation of technical systems				80
15	Optimisation of technical systems				60
	Overall (total of 1020 hours)	**320**	**280**	**280**	**140**

The following and final chapter will attempt to explain how this guideline can help design the vocational education in the classroom. Here the framework curricula provide little support – and for good reason.

Didactic foundations and work process orientation

Since 1991, it has been the objective of vocational education and training to provide trainees with the skills to autonomously plan, implement and assess work tasks in the context of their vocation (KMK 1991). This goal already existed, previously indicated, at the beginning of the 20th century with the orientation toward the master craftsman. The introduction of Taylorist working forms and the growth in industrial importance, the model example of the education moved towards the subservient employed worker. Since 1991, the aim has once more become to promote autonomy, independent of whether a person is employed or not. Such an aim requires education that promotes autonomy. The framework curricula do not name any concrete teaching methods or how such education should be implemented, but in each framework curriculum's introduction, the following points are mentioned for orientation in standardised form.

- Didactic points of reference are situations that are important for carrying out the vocation (learning for doing).
- The learning basis comprises actions, ideally performed oneself or at least mentally comprehended and understood (learning by doing).
- Actions must be planned, implemented, monitored, where necessary corrected, and ultimately assessed by the learner, preferably autonomously.
- Actions should promote a holistic understanding of the professional reality, e.g. contain technical, safety-related, economic, legal, environmental or social aspects.
- Actions should be integrated with the learners' experiences and should reflect their social impact.
- Actions should also include social processes, for instance declarations of interest or conflict resolution.

Apart from these orientation points, the education is now only framed by the provision of a brief description of the areas of learning with keywords on the contents. Area of Learning no. 13, "Ensuring the operation of automated systems", of the framework curriculum shown above, the extent of such a description will briefly be illustrated (Table 3).

Table 3: Exemplary area of learning description

Vocation: Industrial mechanic		
Area of learning no. 13	**Ensuring the operation of automated systems**	**3rd year of training** **Approximate time scale: 80 hours**
Formulation of aim: • Pupils ensure the operation of automated systems. For this they analyse automated systems by using technical documentation, also available in English. • With consideration of the prescribed procedure and the manufacturer's documentation, they develop solutions for process optimisation of individual subsystems. • In order to repair operating faults, they develop strategies to isolate faults, apply them and then eliminate the fault with due consideration for economic aspects. • The pupils modify systems and test, document and present their solutions. They pay attention to the necessary steps for vocational safety when dealing with manufacturing and handling systems. • They assess the economic and societal aspects of automation engineering		
Content • electropneumatic and electrohydraulic functional units • Control		

- Regulation
- Programmable controls
- Operating modes
- Sequential function chart, function block diagram
- flexible handling systems
- Interfaces
- Maintenance regulations
- Safety equipment

I previously referred to the teachers following the old paradigm of scientific orientation as subservient. Under the new paradigm of work-orientation aimed at promoting autonomy, a change took place in basic attitudes: Only teachers that can work autonomously can provide within their education a framework to enable the pupils to learn autonomy. It would be a considerable contradiction in the concept if the teachers required their pupils to be autonomous, while simultaneously behaving subservient in their own actions. There are also other important points that speak for removing teaching regulations. How can differentiated education be promoted when an educational method has already been prescribed? How could holistic actions in class (planning, implementation and assessment) be initiated, if education were divided into small methodological substeps?　And finally: how should pupils learn about participating in shaping their environment, if the teacher already prescribes the entire layout beforehand, as this in turn was given to him?

Starting point is that the areas of learning as an intermediate reference are given in the framework curriculum. What is missing in the framework curriculum is on the one hand the vocational spheres of avtivity (relation to work) and on the other hand the learning situations (relation to classroom teaching). With the above-mentioned instruments of the vocational sciences (macro-level: sector analysis, meso-level: case studies, micro-level: on-site visits, interviews and workshops) the work process knowledge has been explored. The connection between the workplace and classroom teaching has, linking to this preliminary work, the following rough stages:

1. Identification of vocational spheres of activity

- Work processes are demonstrated systematically in form of a work process matrix using data from on-site observations as well as interviews with experts from various representative companies. Within a work process matrix, the work process is split into four stages: order clarification, planning, implementation and completion. Every stage is specified using five dimensions: (1) Laws, regulations, standards; (2) Company conditions and rules; (3) Customer requirements; (4) Work steps and methods; (5) Work objects.
- Work processes that feature a logical connection are clustered together: the work process matrices are integrated. Previous research has shown that a job typically comprises between 12 and 15 of such clusters. A cluster may contain many less-extensive or few extensive work processes. Each cluster forms a vocational sphere of activity.
- Parallel to the previous steps or following these two steps, moderated workshops lend themselves to better group these work processes into vocational and professional action sphere by providing different perspectives or to subsequently validate the resulting vocational sphere of activity in communication.
- A description is drawn up for each vocational sphere of activity that comprises the following aspects: (1) Typical orders, (2) Typical Work Flow (work process steps), (3) Curriculum: Reference to the existing framework curriculum (4) Vocational competence needed with two dimensions: (4a) work process phases (order clarification, planning, implementation, completion) and (4b) required competence to act

in each phase (with the sub-dimensions technical, methodical, social-personal competence), (5) trends in the vocational sphere of activity.

2. Planning and implementing learning situations for school-based vocational education

The next step comprises developing as a teacher team a vocational learning situation for the classroom using the information available (vocational sphere of activity with reference to the framework curriculum). This stage comprises the following steps (according to Berben 2006, p. 372 ff.; see also Bader and Schäfer 1998; Kremer and Sloane 2001; Howe and Knutzen 2011):

- Analyse areas of learning: Which key goals are formulated in the area of learning (framework curriculum)? Which vocational and cross-vocational thematic areas do the area of learning focus on? What relationship can be seen between the area of learning and the vocational sphere of activity?
- Specifying a vocational sphere of activity for class: Which work process steps or rather work process stages should the learning situation's focal areas fall on? Which working tools and methods and which elements of the vocational competence to act are important to the learning situation within the area of learning?
- Description of task and learning situation: Which task is exemplary and relevant for the underlying vocational sphere of activity? Is the task suitable to the developmental level of the learner in terms of complexity, requirements and scope? Does the task allow for various solution possibilities? Can the task be carried out at school? What is the wording of the task for the students?
- Specify the key promotional areas: In concrete terms, what are the focal areas for competence-building within the learning situations? What is the key content to be processed within the task set?
- Establish the required resources for the learning situation: What kind of environment is required for implementation of the learning situation? Which key subject matter is required for the learning situation?
- Clarifying the necessary conditions for learning and determining the amount teaching required? Which competences are needed to tackle the task and what competences do the students already possess? Can the gap be closed through self-organised learning or do supplementary subject-oriented educational units need to be planned in? When are these subject-oriented educational units to be implemented in concrete terms?
- Implement the learning situation and supporting reflection on acquired experiences: How, when and who presents a customer order? How can all the phases of the learning activity (order clarification, planning, implementation and completion) be accompanied supportively? How can the social learning processes be supported through the teacher's actions? How can reflection be initiated in the learning process and when should these reflection phases be planned in?
- Concluding reflection and systematisation of the acquired knowledge: How can the acquired knowledge be linked and structured into a systematic relationship? Are overarching (economic, environmental, social) implications also included in the reflection? How can the knowledge gained be transferred to other situations and what modifications would be required in this case?
- Assessment of learning achievement: What competences did the students develop within this learning situation (with separate evaluations of technical, social and personal competences on the one hand as well as their expression in terms of communicative competence, methodological competence and learning competence on the other).

The reduction in statutory provisions in the framework curriculum creates space for didactic decisions in the classroom. However, these activity spaces must now be filled by the teachers and students, posing a large challenge for both sides.

Conclusion

Since the introduction of the areas of learning concept, a significant change took place in the school-based part of the dual system that led to the work-oriented turn. The new framework curricula are designed to orient areas of learning in school above all according to vocational spheres of activity. This reorientation means the distinction between "theory = school" and "practice = company" loses significance. The development since 1990 does show that on the whole not only has school-based vocational education and training moved closer to work, but also that the company side has seized an important educational objective with the requirement to promote autonomy. Crucial to all these questions is the used concept of competence: the expectations in terms of outcomes have a structure-building effect on company-based and school-based education and training. But crucial is also to prove empirically the underlying assumptions and effects of the concept.

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