From Diagnostics to Learning Success

Professional and VET learning
Volume 02

Scope
"Professional and VET learning" is a book series that focuses on professional competencies and identities, but also on conditions and societal frames of job performances. It includes education in economics, medicine, handicraft, ICT, technology, media handling, commerce etc. It includes career development, working life, work- integrated learning and ethical aspects of the professions.

In recent years the learning in the professions and through vocational education has become a central part of educational psychology, educational politics and educational reflections in general. Its theoretical modeling, practical application and measurement standards are central to the field. They are also specific for a new research realm which is until now, especially in the US, minor developed. For Europe the dual system, learning in the professional school and – at the same time - learning in the firm, can be a model for studying how issues of professional belonging, professional life meaning, professional biographies, professional change, but also especially professional competencies and sovereignties respectively securities are generated.

The books in this series will be based on different theoretical paradigms, research methodologies and research backgrounds. Since the series is internationally connected, it will include research from different countries and different cultures. The series shall stimulate a practical discourse and shall produce steering knowledge for political decisions in the field. We invite contributions, which challenge the traditional thinking in the field. Professionals who are accountable, available and certificated shall receive through this series a fundamental support, but also new horizons and broadened perspectives of the domain.

From Diagnostics to Learning Success

Proceedings in Vocational Education and Training

Klaus Beck

Olga Zlatkin-Troitschanskaia

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TABLE OF CONTENTS

OLGA ZLATKIN-TROITSCHANSKAIA & KLAUS BECK

FOREWORD

By editing this book we honor Professor Klaus Breuer who is retiring from his professorship at the Johannes Gutenberg-University of Mainz. Klaus Breuer has taught in the field of business and economics education at the Faculty of Law, Management and Economics for nearly twenty years. He has been a passionate teacher favored by thousands of students as well as a respected and highly esteemed colleague. In 2006 Professor Breuer was elected dean of his faculty for a regular mandate of three years, a time span during which many talented new professors were recruited. Klaus Breuer conducted all the necessary negotiations and helped the faculty acquire a number of remarkable new scientific staff members. In addition, from 2008 to 2012 Klaus Breuer was a member of the executive board of the German Association for Educational Research, an important and prominent position in which he contributed to the association's formation and also its economic welfare by managing its financial affairs.

This is only one facet of Professor Breuer's lasting legacy for the good reputation of his faculty. During his nearly two decades of intensive work he stimulated, counseled on and evaluated hundreds of Diploma, Bachelor and Master theses; he also convinced selected postgraduates to embark on doctoral dissertations, encouraged their efforts and led them to the positive completion of their endeavors. As a member of several international scientific associations, Professor Breuer cultivated and still is cultivating intensive and productive contacts across continents.

Given the limits of a foreword, we cannot enumerate and highlight all the awards Professor Breuer has earned during his long career at the Johannes Gutenberg-University of Mainz. Rather, by dedicating this book to him we are attempting to express our gratitude for all he has accomplished for the scientific community, for our university and its Faculty of Law, Management and Economics, for his colleagues and, not least, for his students.

In addition to his multifaceted scientific interests, Professor Breuer's main research activities have been, and still are, concentrated in particular on the development of complex teaching-learning arrangements in business and economics education and of valid new procedures for examination and assessment strategies in the field of vocational education and training. In several large research projects Professor Breuer created and validated diagnostic methods by simulating real-life work situations and gained useful information on the vocational competence of examinees. This research received a great deal of attention from actors in the field of educational policy development and has had a huge impact on several economic branches where

his suggestions for vocational examinations are practiced with much success and wide acceptance. Professor Breuer's research has been published extensively and quoted in many books and articles in English and German.

The title and thematic structure of this book have been designed to tie in with Professor Breuer's multifaceted interests and to mirror at least some of his fundamental ideas for a better understanding of the process of vocational maturation. Chapter I comprises papers dealing with basic research concepts in Vocational Education and Training (VET). Robert D. Tennyson presents his interactive cognitive model and its components and honors Professor Breuer's scientific contributions. The next component of this chapter is by Marold Wosnitza, Balthasar Eugster and Kerstin Helker. It focuses on universities as venues for self-regulated vocational education and training. The studies presented here also indicate the potential for linking teaching and learning research to educational theory. The last component of this chapter is by Jürgen van Buer and Gritt Fehring. They analyze conceptual differences among major notions in vocational education such as profession, professionalism, employability and trainability – with respect to German and European debates. They bring attention to conflicting perspectives on vocational skills and vocational education.

Chapter II contains five articles dealing with the content, objectives and outcomes of VET. In the first article, Klaus Beck refutes the thesis of a holistic, universally valid ethical principle in favor of a "systemic particularism". In his opinion, developing moral judgment should be a component of vocational education. Thomas Bienengräber examines situationism in business education from a didactical perspective and highlights implications for the construction of learning situations. Susan Seeber and Rainer Lehmann focus on the preconditions of successful job training and evaluate the influence of general skills acquired during in-school education on the success of commercial apprenticeships. The last paper in this chapter is contributed by Fritz Klauser and Juliana Schlicht. They assess the value of intangible phenomena in teaching and learning processes such as knowledge, skills, attitudes, motivation and emotion from both a pedagogical perspective and an economic point of view with regard to adult education in technology/computer-based and traditional classroom settings.

Chapter III comprises articles which deal with various methods of instruction in VET. Stefanie Hillen seeks to answer the question of what research on technology used in VET can teach us about media didactics. Alfred Riedl and Andreas Schelten address technical discussions as supportive interventions in the process of constructivist teaching and learning in VET, while Hugo Kremer examines the potential of social media in VET and also looks at the associated challenges. Gerhard Minnameier places focus on the domain of business and economics education and critically discusses an inferential theory of knowledge acquisition in the context of VET. In the next paper, Wim J. Nijhof and Cindy Poortman zoom in on VET in the Netherlands. They present the results of their empirical study assessing the effectiveness of work-study programs in which learning at school and learning at work are integrated in the formation of professional skills. In the closing paper of this chapter, Kerstin Norwig,

Cordula Petsch and Reinhold Nickolaus present results concerning the evaluation of the VET program BEST and point out the importance of continuously supporting low-achieving apprentices in industrial and technical fields (construction sector).

Chapter IV includes papers in one of Professor Breuer's major research areas: diagnostics and assessment in VET. In educational research, "competence" is a passionately debated term. The papers in this chapter pick up the debate. Andreas Frey and Jean-Jacques Ruppert model and analyze the interaction of social, personal, method and subject-related competence as dimensions of comprehensive (professional) competence. In the next paper, Detlef Sembill, Andreas Rausch and Kristina Kögler discuss the meaning of the non-cognitive elements of competence. They argue that not only cognitive facets but also affective and motivational elements are important in self-regulated behavior. They have developed a model to demonstrate the multidimensionality of modeling and measuring competencies. Nina Bender and Daniela Barry survey self-regulated behavior when dealing with financial matters. They present a survey in which financial self-regulation as an important factor of competent action can be measured with the help of the Trait Self-Regulation Questionnaire (TSRQ). In the next paper, Eveline Wuttke and Jürgen Seifried focus on modeling and assessing diagnostic competence, in particular professional error competence, as an important facet of teacher competence. They present preliminary results of an empirical study of business education students. Christoph Metzger continues the discussion on diagnostics and deals with the potential and limitations of standardizing oral examinations in VET. He especially honors Professor Breuer's contribution to this field of research.

The first three papers in Chapter V, the book's final chapter, provide assessments of school autonomy in VET. Peter Nenniger concentrates on new Swiss business education and presents the results of an empirical study. Ralf Tenberg and Julia Warwas report on a meta-analysis on the subject of school leadership which can be used as guidance for German research in this field. In the next paper, Olga Zlatkin-Troitschanskaia, Jana Seidel and Martin Stump focus on teachers' evidence-based actions. The authors discuss variations among teachers in different types of schools, brought together from the results of a new research project, EVIS. The last contribution to the book is by Thomas Deissinger. It is focused on the latest European structural development in VET: the European Qualifications Framework (EQF). In this paper, the question is discussed of whether the German Qualifications Framework can be used as an instrument to contribute to permeability and progression within the VET system.

We do hope that Professor Breuer will enjoy reading the various contributions written especially in his honor and, maybe, entering into a discourse with the authors of one or more of the articles that stimulate his objection or even his enthusiasm.

Mainz, Germany, August 2012
Olga Zlatkin-Troitschanskaia
Klaus Beck

CHAPTER I

BASIC RESEARCH CONCEPTS IN VET

ROBERT D. TENNYSON

DEFINING A LEARNING THEORY LINKED TO INSTRUCTIONAL THEORY

A Fusion of German and American Approaches

Klaus Breuer and I met in the fall of 1974. I was a new assistant professor at Florida State University and Klaus was a graduate student from Aachen visiting American universities that were doing research investigating the link between computers and human learning. From that initial meeting until the present time, Klaus Breuer and I have collaborated on numerous research projects and have published books, research articles, and book chapters dealing with the fusion of European and American psychology in the field of instructional design. This chapter presents our joint efforts in defining an instructional theory which has and is the basis of our joint activities over the years.

INTERACTIVE COGNITIVE MODEL

Klaus Breuer and I both felt that defining our theory of learning would help us in developing our research in the area of problem solving and decision making. We started with the premise that in defining a learning theory to provide the psychological foundation for instructional theory we did not what to follow the usual practice in the traditional behavioral psychology theory of relying on reductionist models that had little practicality for education. Likewise, cognitive learning research was following, until recently, the conventional sequential approach of science; that is, studying the parts (or components) while ignoring the complexities that emerge as a consequence of the interaction of the component parts of the overall mental system. With the growth of complexity theory in the sciences (e.g., physiological (Li & Xu, 1987); and clinical psychology (Chubb, 1990; Lonie, 1991; Moran, 1991); strategic thinking (Mann, 1992); decision making (Richards, 1990); systems theory (Stevens, 1991); and instructional design (Tennyson, 1997)) that attempt to capture complexity of dynamic phenomena as well as sequential, it seemed appropriate to consider, for instructional theory, learning theories that view nonsequential as an inherent characteristic of the dynamic nature of learning and thinking.

Early attempts to describe cognitive learning followed the classical scientific method of trying to formulate laws that could explain learning via sequential

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 3–10.

relationships. For example, the early information-processing models resembled computer system architecture with input/output boxes and arrows. It was quite easy to explain simple learning situations with such models but in situations with multiple dynamic conditions (e.g., time, anxiety, and environmental variables) it became increasingly difficult to predict learning outcomes. By the late 1990s, cognition had come to be viewed as a fluid-dynamic phenomenon that is adaptive to state situations (Steiner, 1997). Instead of a concrete sequential method of information processing, cognition self-adjusts, restructures, and constructs in highly unpredictable ways. The important concept in understanding cognition is that the many components (or subsystems) of the cognitive system flex and adapt in an infinite number of ways. Therefore, it is not possible to develop a sequential model to explain learning but rather we seek to define a structure that allows for learning and thinking to occur in a natural environment, taking into account experiences from the environment as well as the need to construct knowledge from existing knowledge in memory.

Rather than propose yet another cognitive learning model in the tradition of sequential models, we designed a model from a complexity theory perspective developed by Tennyson and Breuer (1997). That theory proposes an interactive cognitive model of learning and thinking (see Figure 1). The cognitive learning model provides an educational explanation for learning; the purpose of the model is to serve as a psychological foundation to instructional theory.

Model Guidelines

In preparing this interactive cognitive model, the guidelines employed by us were threefold. First, the model would have to address both the sequential and dynamic elements of cognition. Second, the model would have to deal with the interaction of content knowledge and cognitive strategies for higher order cognitive processes (e.g., problem solving, decision-making, troubleshooting, and creativity). And, third, the model would have to include affective elements as an integral component of the cognitive system.

The basic subsystems of the interactive cognitive model (Figure 1) include the following components; sensory receptors (sensory memory), executive control, affects, and knowledge base. The model also indicates two primary sources of information to the cognitive system: external and internal. External information enters the cognitive system through the standard sensory mechanisms whereas internal information is the result of the active interaction between the various subsystems and the executive control subsystem. External behavior is exhibited through the output of the sensory memory component.

Notice that the model does not represent a conventional information-processing model but rather a highly dynamic, interactive system that assumes constant integration of the various subsystems. Each of the components is now discussed in a sequential fashion, although this does not represent how the system operates.

Sensory Receptors Component

The sensory receptors component includes the various ways in which external information is entered into the cognitive system. Information is conveyed through the sensory component and is passively registered in sensory buffers in more or less complete analogical form. These sensory registers are sometimes referred to as primary sensory memory. The information in this register decays rapidly and is easily interrupted. Attention- and perception-driven processes in the executive control component determine what subset of this information is selected for further processing because far more information is registered than can be processed and stored.

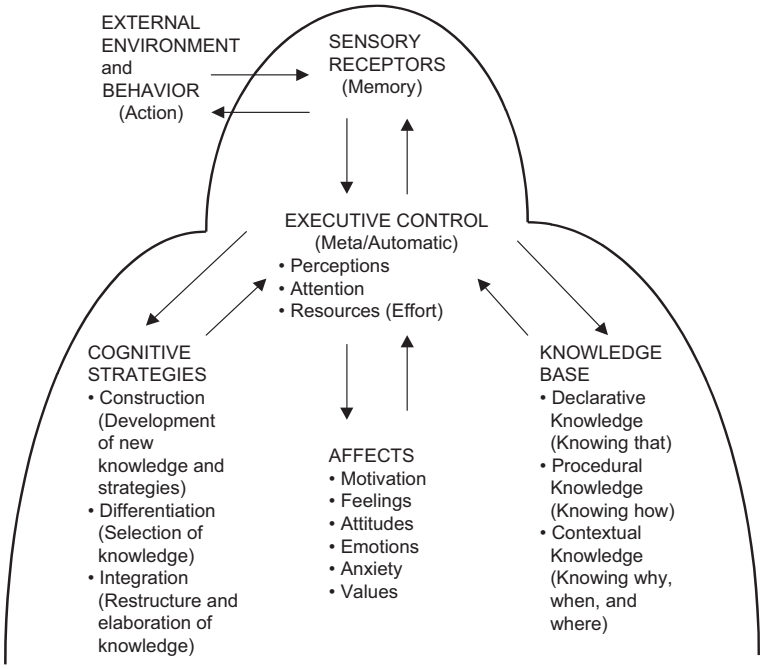

Figure 1. Interactive Cognitive Model.

Executive Control Component

Control of the cognitive system is usually referenced by some form of an executive processor. The executive control regulates the various components and cognitive abilities of the system in either active (i.e., meta-complexity; e.g., Streufert & Nogami, 1989; Suedfeld, 1992) or automatic (passive) means. Although cognitive theories differ on specific functions and their distribution in the complexity of the system, for the purposes of this section dealing with an educationally based learning theory, it is convenient to consider three primary executive functions; perception,

attention, and resources. It should be noted that in sequential information-processing models, the label *short-term* or *working memory* is used to describe many of the functions of this component.

Information coming from either external or internal sources passes through the perception function, which performs the cognitive processes of being aware of and assessing the potential value of, the external and/or internal information. In this function, the perception process services the cognitive system for the purposes of both directing attention and determining effort (i.e., resources). The attention function maintains an active interaction with the other components by the internal processing cognitive abilities.

Resources assist in the coordination of the various components of the entire cognitive system. Of importance in this function is evaluation of the effort associated with a given situation. For example, in most situations, there is an abundance of resources available, so determination is made on allocation of necessary resources. The resources function includes the following four processes:

- *Encoding* processes that, in concert with the perception function, deposit incoming information into the knowledge base;
- *Storage* processes that interact with the knowledge base component to create permanent records and increase the strengths of existing records;
- *Retrieval* processes that interact with internal processing abilities to obtain necessary existing knowledge from the knowledge base (there seem to be at least two different types of retrieval processes: controlled [i.e., meta] processes that are deliberate, conscious efforts interacting with the knowledge base and affects components; and, automatic processes that are highly developed and efficient interfaces with the other components); and
- *Maintenance* processes that keep information in an active mode so that it is not lost before it is stored in the knowledge base.

In summary, the executive control component manages the internal behavior of the system in terms of interfacing the various system components' cognitive abilities based on multiple and complex possibilities. Additionally, the executive component controls the output of behaviors. Behavioral outputs can range from automatic to deliberate conscious activities.

Knowledge Base Component

The knowledge base is the repository for previously acquired information – either external or internal. There is agreement in the psychological field that the knowledge base has no capacity limits and that knowledge is considered permanent, although it may become difficult to retrieve in certain situations. The knowledge base consists of domains of knowledge that can be described as complex networks (or schemas)

of information (e.g., concepts or propositions). Within a domain, knowledge is organized into meaningful modules called schemata. Schemata vary per individual according to amount, organization, and accessibility. Amount refers to the actual volume of knowledge coded in memory, whereas organization implies the structural connections and associations of that knowledge, and accessibility refers to the cognitive skills used in servicing the domains of knowledge.

Within the knowledge base there are various types of knowledge; declarative, procedural, and contextual (Tennyson & Rasch, 1988). Declarative knowledge implies awareness and a meaningfulness of content (e.g., concepts, rules, principles) and refers to the *knowing that*; for example, understanding the meaning of the four basic functions of mathematics. Procedural knowledge implies a *knowing how* to employ selected concepts, rules, and principles with newly encountered problems. Contextual knowledge implies an understanding of *knowing why, when, and where* to employ specific concepts, rules, and principles. This knowing of why, when, and where is governed by selection criteria embedded within the organization of the domain of knowledge. Selection criteria are integrated within the knowledge base because of the interaction with the affects component during the acquisition process. The term *contextual* implies direct association with cognitive skills that are defined as domain-dependent cognitive strategies. As such, contextual knowledge represents a more complete understanding of human behavior that is necessary for defining an educational learning theory.

Affects Component

Since the 1950s, with the division of the cognitive and affective domains (Bloom, Engleharee, Furst, Hill, & Krathwohl, 1956), learning theories and instructional theories have labored with the construct that even though these two domains are not separate they need to be presented as separate. (Note that this is an example of the reductionist method used in psychology.) Cognitive psychology continued this practice of separate domains for cognition and affective (as well as the psychomotor) well into the 1980s. Only recently have certain cognitive psychologists *discovered* that the affective domain may actually dominate the cognitive (i.e., many of the constructivist ideas promote this concept; e.g., Brown, Collins & Duguid, 1989, with situated cognition; Harré, 1984; Vygosky, 1978).

Klaus Breuer and I brought the affects component directly into the total cognitive system because of the clear need in instructional design to have a learning theory that implies that the affective domain is integral to the development of learning environments.

As stated above, cognitive theories differ in details but have much in common, and the same is true of the affective domain. Given the complexity of the affective domain and the limited scope of this discussion, we only address some of the more identifiable affective variables. Also, because of their interactive nature and variability, we are listing the various types of affect without reference to hierarchy or value

(see Figure 1). The list includes such complex personality variables as motivation, feelings, attitudes, emotions, anxiety, and values. The immediate interaction of this component within the cognitive system is with the executive control component that interfaces with the knowledge base component. For example, motivation influences both attention and maintenance processes. On the other hand, values and feelings would influence the criteria associated with acquisition of contextual knowledge. Anxiety as an affect variable influences much of the internal processing abilities. Along with emotions, anxiety can be a serious interfering variable in the cognitive system.

The implication for instructional theory of the affect component is the need to consider this component as an integral part of the acquisition of knowledge. In educational practice, the continuing effort is to separate the affect from the cognitive. For example, this is seen in the development of separate courses on ethics in professional studies (e.g., law) and in the education field, topics in character education (e.g., courses on respect and violence). In summary, the affect component needs to be considered during the acquisition of knowledge and as part of domains of knowledge.

Cognitive Strategies Component

The cognitive strategies component, in contrast to the knowledge base component that is concerned with specific content of human thought and action, is primarily concerned with the structural process of cognition and its effect upon behavior. This component of the interactive cognitive complexity-learning model has served to explain and, in many cases, predict human cognition and behavior for more than 60 years. Early forms of cognitive complexity theory were based on developmental psychology (e.g., Lewin, 1936; Mead, 1934; Schachtel, 1959; Werner, 1957) and constructivist psychology (Bartlett, 1932). The growth of cognitive complexity approaches to learning theory increased with the advent of relevant measurement techniques (e.g., Asch's 1946 Impression Formation Task, the Role Concept Repertoire (REP) Test used by Bieri (1955) and Kelly (1955), the Sentence/Paragraph Completion Test of Harvey, Hunt and Schroder (1961) and the applications of multidimensional scaling employed by Breuer (1983) and Driver (1962)).

Initially, complexity theory considered only the availability and utilization of cognitive dimensions in human perception. Work by Bieri and associates (1966), for example, focused on the presence or absence of differentiated dimensions in interpersonal judgment. Harvey et al. (1961) proposed a model for the development of dimensionality and emphasized that higher levels of cognitive functioning must include the integration of differentiated dimensions. In addition to the two general cognitive abilities of differentiation and integration, contemporary science-wide complexity theorists offer a third type of cognitive ability when they refer to the growth of systems toward the *edge of chaos*, a level where optimal adaptive functioning is attained.

At the edge of chaos, systems are viewed as undergoing spontaneous self-organization. Indirect or direct learning takes place. Order and chaos are most often kept in balance. Regulation of the system orients it to feedback from the environment but allows enough freedom to assure that the system can be creatively adaptive, that is, open to change. Interconnections among systemic elements are sufficient in number to generate dynamic functioning, but generally not so excessive that chaos would be generated.

Extending the early work from cognitive complexity with current concepts from chaos theory, Tennyson and Breuer proposed that the cognitive strategies component includes three primary cognitive abilities; differentiation, integration, and construction. Differentiation is defined as the twofold ability to understand a given situation and to apply appropriate contextual criteria (i.e., the standards, situational appropriateness, and/or values) by which to retrieve specific knowledge selectively from the knowledge base. Integration is the ability to elaborate or restructure existing knowledge in the service of previously unencountered problem situations. Construction is the ability both to discover and to create new knowledge in novel or unique situations.

CONCLUSION

The scholarly work that Klaus Breuer and I have collaborated on for 40 some years has lead to a fusion of European and American efforts to improve learning through the employment of learning theories and technology. This collaboration has resulted in peer reviewed publications and presentations at international conferences. Additionally, our work resulted in collaborative efforts with colleagues not only in Germany and the US, but also with scientists throughout the world from North America to Asia and most European countries. From that first meeting in Tallahassee, Florida, Klaus Breuer and I have developed through our respective graduate students a truly international network of scholars focusing on the fusion of human cognition and technology.

REFERENCES

Asch, S. E. (1946). Forming impressions of personality. *Journal of Abnormal and Social Psychology, 41,* 258–290.

Bartlett, F. C. (1932). *Remembering: An experiment and social study.* Cambridge: Cambridge University Press.

Bieri, J. (1955). Cognitive complexity-simplicity and predictive behavior. *Journal of Abnormal and Social Psychology, 51,* 263–268.

Bieri, J., Atkins, A. L., Briar, S., Leaman, R. L., Miller, H., & Tripodi, T. (1966). *Clinical and social judgment: The discrimination of behavioral information*. New York: Wiley, 46–62.

Bloom, B., Englehart, M., Furst, E., Hill, W., & Krathwohl, D. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain.* New York: Longman Green.

Breuer, K. (1983). Personen und Medien in Interaktion: Das Konzept der kognitiven Komplexität in der Medienpadagogik [Interaction of learners and media: Cognitive complexity theory in mediated instruction]. *Schulpraxis, 3/4,* 22–25.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18,* 32–42.
Chubb, H. (1990). Looking at systems as process. *Family Process, 29,* 169–175.
Driver, M. J. (1962). *Conceptual structure and group processes in an international simulation. Part 1: The perception of simulated nations* (ONR Tech. Rep. No. 9). ETS and Princeton University.
Harré, R. (1984). *Personal being: A theory for individual psychology.* Cambridge, MA: Harvard University Press.
Harvey, O. J., Hunt, D., & Schröder, H. M. (1961). *Conceptual systems and personality organization.* New York: Wiley.
Kelly, G. A. (1955). *The psychology of personal constructs: Vol. 1. A theory of personality.* New York: Norton.
Lewin, R. (1936). *Principles of topological psychology.* New York: McGraw-Hill.
Li, W., & Xu, L. C. (1987). Chaos and its significance in physiological psychology. *Acta Psychologica Sinica, 19,* 548–560.
Lonie, I. (1991). Chaos theory: A new paradigm for psychotherapy? *Australian and New Zealand Journal of Psychiatry, 25,* 548–560.
Mann, S. R. (1992). Chaos theory and strategic thought. *Parameters, 22*(3), 54–68.
Mead, G. H. (1934). *Self, mind, and society.* Chicago: University of Chicago Press.
Moran, M. G. (1991). Chaos theory and psychoanalysis: The fluidic nature of the mind. *International Review of Psychoanalysis, 18,* 211–221.
Richards, D. (1990). Is strategic decision making chaotic? *Behavioral Science, 35,* 219–232.
Schachtel, E. G. (1959). *Metamorphosis.* New York: Basic Books.
Steiner, G. (1997). Educational learning theory. In R. D. Tennyson, F. Schott, N. Seel, & S. Dijkstra (Eds.) *Instructional design: International perspective, Vol. 1*. Hillsdale: Erlbaum, 215–245.
Stevens, B. A. (1991). A challenge to refine systems theory. *Australian and New Zealand Journal of Family Therapy, 12,* 23–26.
Streufert, S., & Nogami, G. Y. (1989). Cognitive style and complexity: Implications for I/O psychology. *International Review of Industrial and Organizational Psychology.* London: Wiley.
Suedfeld, P. (1992). Cognitive managers and their critics. *Political Psychology, 13,* 435–453.
Tennyson, R. D. (1997). A system dynamics approach to instructional systems development. In R. D. Tennyson, F. Schott, N. Seel, & S. Dijkstra (Eds.) *Instructional design: International perspectives, Vol. 1: Theory and research*. Hillsdale, NJ: Erlbaum, 413–426.
Tennyson, R. D., & Breuer, K. (1997). Psychological foundations for instructional design theory. In R. D. Tennyson, F. Schott, N. Seels, & S. Dijkstra (Eds.) *Instructional design: International perspectives, Vol. 1: Theory and research.* Hillsdale: Erlbaum, 113–133.
Tennyson, R. D., & Rasch, M. (1988). Linking cognitive learning theory to instructional prescriptions. *Instructional Science, 17,* 369–385.
Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes.* Cambridge: Harvard University Press.
Werner, H. (1957). *Comparative psychology of mental development.* New York: International Universities Press.

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UNIVERSITIES AS A PLACE OF SELF-REGULATED VOCATIONAL EDUCATION AND TRAINING

When in 1919 Max Weber presented his ideas of "Science as a Vocation" to an audience of students, science – at least in the European context – had a totally different societal meaning and was even a somewhat more difficult starting point for graduates than it is at the beginning of the twenty-first century. Weber, however, taps the pulse of the age, after some preliminary considerations, drawing his audience's attention to the "inward calling for science [dem inneren Berufe zur Wissenschaft]" (Weber, 1922/1988, p. 588). Getting engaged with science also means getting involved in specialization, which is naturally associated with the inescapability of an ever imperfect scientific work. The researcher's passion is opposed to the fact that all knowledge is limited in its validity and that it only seems to serve the purpose of being overcome or even rejected at some point in time.

The area of conflict Weber describes as lying between science as outer and inner vocation at first only refers to the academic occupation in its narrow sense. Its main concern is the formation of the academic habitus, which on the one hand follows the ideal of dedication to the research matter but on the other hand is constantly aware of the constriction by the organizational hierarchy (Oevermann, 2005). This is what constitutes science as the type of the unity of research and teaching and those who are following an academic profession have to bear this unity. Max Weber considers this to be the personal challenge for every scientist: teachers should not be prophets or even demagogues but instead they should stick to the facts of this world. This is the code of behavior in a disenchanted world and also the basic pattern of scientific teachers. For Weber the fate of his times is the parallelism of rationalization and intellectualization which both add up to the discharge of the monumental in science. Those who go into research have to content themselves and struggle with the small matters.

Weber's considerations presented above also outline the foundations of research from a sociological point of view. In order to generate new insights, commitment to the pure matter of the scientific object is necessary. At the same time, this object is embedded in the context of everyday life, which makes research a balancing act between the most accurate description of the object and the responsible usage of insights into the living environment.

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 11–24.

By pinpointing this field of conflict, Weber's writing becomes a sociological link at the dawn of a new era in university history and also in the reformulating of scientific professionalism. In its beginnings in the Middle Ages, the European university was a place of vocational education. Subject matters of the higher faculties were aiming at specific professions with the faculty of arts presenting their propaedeutic. This situation changed in the nineteenth century inasmuch as due to the establishment of teacher education the faculty of (liberal) arts was able to establish its own professional orientation. During the time of these institutional reforms there was another, almost unnoticed change taking place which later turned out to be fundamental for academia. Based on the idealistic epistemology the method applied for gaining knowledge became more and more important compared with the subject matter (Stichweh, 1994). This development was the precondition for Max Weber's understanding of science as a vocation, because only if the method guarantees the possibility of continuation of knowledge, can the content of knowledge be rejected. Only this allows for the extent of the continual coming and going of insight and the declaration of it as a basic scientific principle.

This bilayer structure, however, is the basis for a further evolution of a scientific vocation, because if the method constitutes science, there can be scientific occupations which allow for scientific professions outside of academia and also apart from classic academically educated professions in everyday life, like theologians, lawyers or physicians. The method itself, which can be typified with a subject matter, gains its own worth and also qualifies. People who are scientifically educated are not limited to one subject as they are able to work scientifically and methodologically. Science qualifies one for a job by absolving the educated person from the usualness of the profession. At the same time, these people are scientists above their jobs as they are also able to apply scientific methods. This context again shows Weber's basic idea of a bilayer structure, although in a slightly shifted way. It is the (inner) commitment not only to the subject matter but mainly to the method which is typical of science as it has no counterparts in the (outer) professional world.

SCIENCE, VOCATION AND BOLOGNA

This idealization, however, can only take place under certain societal and economic conditions. In times of confusing and unclear market conditions, a broad methodological knowledge does not guarantee job security any more. When there are too many graduates with unspecific competencies entering the labor market, qualification becomes a problem. The European universities have started reacting to this by a re-specification of the scientific method. Scientific work is combined with qualifications needed for the job. This approach is not new as the different disciplines have always been closely associated with specific fields of work. But due to the fact that the method as opposed to the subject matter excelled itself as the nucleus of science, many degrees remained somewhat unspecific. Graduates usually gained their degree in a main subject, which they had studied with some aspects in depth,

but still completed their studies with a rather generalist degree. The Bologna reform now offers the structural possibility for the curricula of the courses to represent the inner differentiation of the disciplines, which is done by the gradation of the different study courses. The apportionment of two or three phases of studies allows for a functional refinement of the courses, which for example also enables students of one subject after graduating with a generalist Bachelor's degree to choose from several, sometimes highly specialized, Master's programs.

In terms of the sociology of profession, this development remains multi-layered as the disciplines as well as their forms of organization (universities and associations) only half-heartedly react to societal changes. Whether specialized study courses actually enhance graduates' qualifications for labor market demands remains unclear. The scientific education is not specified regarding certain fields of work but the scientific community offers a more nuanced distinction of their methods. Many Master's programs offered do not describe professional fields of work but rather show how to work scientifically on specific questions, which is in line with the market inasmuch as the professions themselves have lost their clear arrangement. Matching academia and profession also means that it is no longer professions that systemize work but rather complex and highly interrelated patterns of work that after all are not too different from the formality of the scientific methods.

By differentiating between outer and inner vocation, Weber indicates that the scientific work implies some aspects that will certainly have consequences for how the reality of university work is represented in higher education teaching. Scientific work means following the rules of methodology on the outside which does not necessarily include a research approach which is guided by curiosity.

Research is more than scientific work – a fact that has been emphasized by the federal conference of lecturers ("Bundesassistentenkonferenz") in their statement in favour of research-based learning (1970). The antecedence of this method is only half the truth as research is part of the scientific self-conception, although in many scientific occupations people work with scientific methods without actually doing research. Research is distinguished by freedom of choice of method, taking detours and the fruitful experience of making mistakes.

SCIENCE AND LEARNING STRATEGIES

To sum up, it can be said that the loneliness of the mind (Schelsky, 1971) is central to research which consequently guides attention to learning to learn and learning strategies – or, with Max Weber: Science only suffices for the inner vocation when it is appreciated and lived as a learning process, i.e. self-regulation of the person. This is how Weber's considerations establish the basis for a sociological rationale of the relevance of self-regulated learning. The research process actually is self-regulated learning and thus studying any science can only take place with an appropriate amount of self-regulated learning, which is on the one hand basic to the scientific vocational training and on the other hand the condition sine qua non for working in

a scientific profession – the outer as well as the inner one. Consequently, higher education is vocational education in this sense, because the scientific profession means working self-actingly according to the rules of the scientific methodology. It takes a second step and a specific context for this academia to become a field of practice. A physician heals patients, the lawyer represents his clients and the priest counsels the believers, and all do so based on their scientific education. This fact becomes even more apparent with study courses which are not traditionally linked to specific professions. As graduates are trained scientifically, they have a high versatility and are able to – or at least expected to be able to – familiarize themselves quickly with a new environment. The opposite, however, also holds true: that scientific nature actualizes itself only in a professional sphere of action. Researchers in universities as well as the people working in scientific occupations are professionals who shape their scientific nature into a specific form. This supports the statement that higher education is vocational training. With the primacy of the method, science can only be understood as a profession, which is what makes universities a place for vocational training per se. It can be stated that this is the deeper meaning of the Bologna process. The production of knowledge becomes a global business, for the complexity of which the differentiation of the borderlines between the classical scientific disciplines was not sufficient. Furthermore, the list of scientific disciplines cannot display the professional world anymore which is why scientific methods have to build the basic structure of scientific work so that subject matter and knowledge can be added flexibly. Regarding the Bologna reform, this is done by the Dublin descriptors, which describe generic competencies and by that show how science can be understood as a yet unspecific vocation (Joint Quality Initiative, 2004). Through this, the European Qualifications Framework becomes a frame of reference, as the generic competencies describe what constitutes science as a profession (Bologna Working Group on Qualifications Framework, 2005). The subject-specific competencies only serve as a kind of refinement of the primary and broad scientific competencies.

Basic requirement of the gradation of scientific capability in the Dublin descriptors is the adequate implementation of strategies of self-regulation in the learning processes of science. Without self-regulation, the continuing qualification from the Bachelor to Master and PhD degree can be accounted for by neither learning theory nor profession theory. Only those students who learn science as a matter of self-regulation can contribute to research and knowledge gain. This is how research-based learning can use research structures as a model for its pedagogical work and research can use study programs for the same matter, which contributes to self-regulation as a microstructure of scientific knowledge gain.

The forms of self-regulated learning take up these reciprocal references and thus contribute to the claim of the unity of research and teaching (and learning) (Breuer, 1992). Research in the sense of reflexive affirmation of learning progress in cognitive reclaim can only work when metacognitive and motivational aspects are effectively combined in the process (Eugster, 2011). These combinations are highly

contributive in successful learning and teaching arrangements (Beck & Breuer, 2002; Breuer, 2002; Breuer & Tennyson, 1995). In short, science as a vocation and thereby higher education as vocational training are influenced by the same terms of learning and instruction as are models of self-regulated learning (Eugster, 2004).

SELF-REGULATED LEARNING PROCESS

Self-regulation, autonomy, self-organization and self-development are concepts which are discussed in all areas of education but specifically in vocational education and training (cf. in summary Breuer & Brahm, 2004; Breuer & Eugster, 2006; Nenniger, 1999; Straka, 2001; Wosnitza & Eugster, 2001) and show a great variety of concepts and perspectives which can be divided into two broad threads (Candy, 1991):

- self-regulation as a learning goal within the sense of autonomy and
- self-regulation in the learning process.

This paper focuses on the latter, which can again be divided into two areas: on the one hand the learning environments which promote self-regulation, such as cooperative learning, e-learning, experiments, research based learning, case studies or problem based learning (e.g. Reich, 2006), and on the other hand the individual learning process itself and its conditions and pre-conditions. Not only the examples mentioned above but also social constructive approaches (Hickey, 1997) show that self-regulated learning – unlike some notions in the literature – is not necessarily a solo-learning approach with an individual regulation process but it does also appear in cooperative learning settings (Konrad, 2005) with the necessity of cooperative regulation processes (co-regulation) by the members of the group. Against this background, a number of researchers have defined or modeled self-regulated learning from their particular research perspective. Even though these definitions and models vary considerably, two basic areas that seem to be highly significant to self-regulated learning can be identified:

- Conditions of the learning environment and the macro context which influences the self-regulated learning process and
- Cognitive, motivational, emotional and metacognitive processes and preconditions in the self-regulated learning process.

Figure 1 postulates the interrelation between these attributes. The core of the model is the interplay of the individual learner's use and availability of learning strategies, his motivation and emotions as well as cognitive and metacognitive regulation processes. This is embedded in the particular learning environment. This central element of the model describes the current learning process, which a learner or a group of learners enters with their individual pre-conditions like prior knowledge or experiences (Volet, 2001b). Moreover, the learning process is influenced by further variables which are not directly related to the actual learning process. These aspects

can be of formal nature like rules and regulations, of social nature like family or peers and of material nature like available resources (Wosnitza & Beltman, 2012).

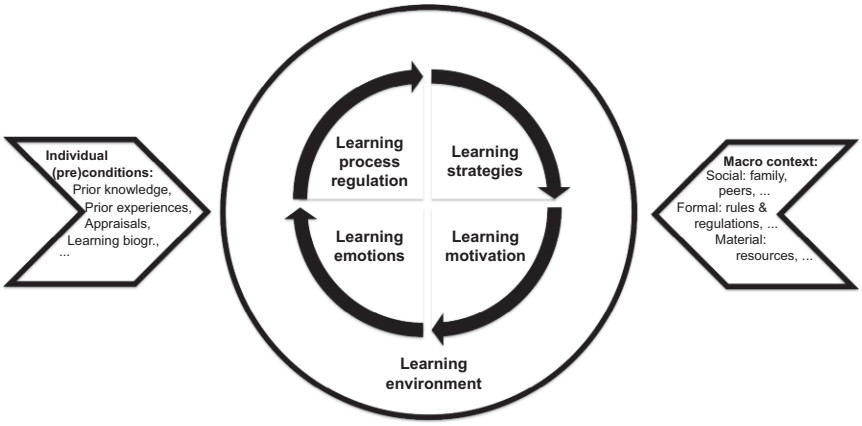

Figure 1. Self-Regulated Learning.

ILLUSTRATIVE STUDIES

To illustrate some of the relations postulated above, results from three different empirical studies conducted by the authors will be presented. The empirical research described reflects a variety of quantitative and qualitative methods. For each example, the specific components of the framework will be identified and defined. Furthermore the learning environment, the research questions, sample and methods shall be described and followed by the presentation of some key findings.

The first example, study 1, examined how far cognitive, motivational and metacognitive regulation strategies of students preparing for an exam in a teacher education program are influenced by the subjective perception of the classroom situation. Study 2 examined how experiences with group work are related to the learning emotions in a collaborative learning environment in education and study 3 investigated the co-regulation processes of groups of students in a problem-based learning environment in a program on industrial education.

Study 1: Motivation, Regulation, Learning Strategies and Learning Environment

Study 1 investigated how student motivation, regulation and learning strategy use were affected by the learning context (Wosnitza, 2000, 2004; Figure 2).

German education students were asked about their perception of social aspects of the learning context and their use of learning and regulation strategies and their motivation while they were preparing for an actual exam. About 85% of the 173 participants were female. The research question was: How are the motivation and use

of regulation and learning strategies of an academic learner related to aspects of the learning environment when preparing for an exam in education?

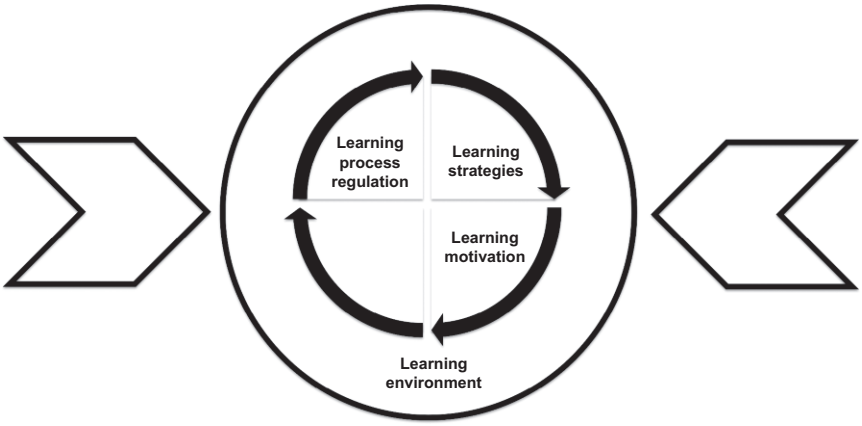

Figure 2. Focus of study 1.

Students completed a questionnaire consisting, among others, of the following, self-developed scales:

- Motivation: *Interest, Motivation*
- Learning strategies: *Implementation*
- Regulation strategies: *Metacognitive control, Cognitive control*
- Learning context: *Teacher Behavior, Classroom management, Sense of Autonomy, Classroom Atmosphere.*

The results of a Linear Structural Equation Model (Chi-Square with 48 DF = 43.4 (p = 0.66), RMSEA = 0.0, GFI = 0.96, AGFI = 0.93) showed that students' *interest* has a significant effect on the use of *regulation strategies* and the *regulation strategies* on the *learning strategy implementation*. All these variables were directly or indirectly influenced by the subjective perception of the learning context (*Teacher Behavior, Classroom Management, Sense of Autonomy*, and *Classroom Atmosphere*).

Overall, this study showed that central variables of a self-regulated learning process are interacting with each other and are influenced by aspects of the actual learning environment.

Study 2: Experiences with Group Work and Learning Emotions in Group Work Settings

Study 2 investigated how students' experiences in a self-regulated collaborative learning environment can influence the learning emotions in an on-going group working setting (Kimmel & Wosnitza, submitted for publication; Figure 3).

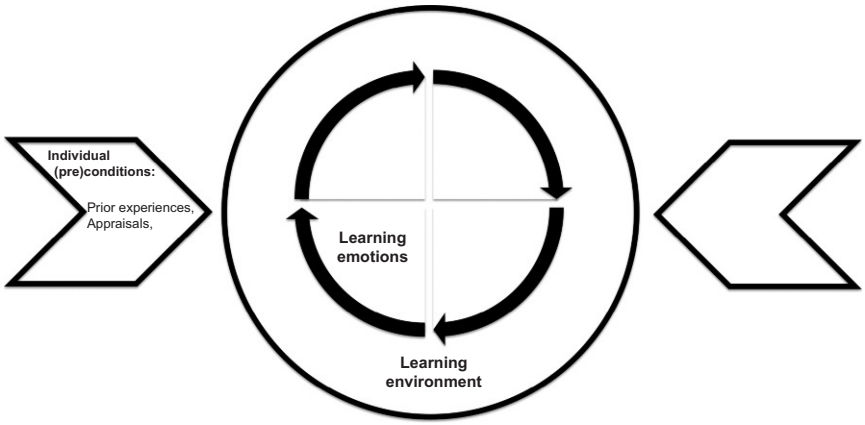

Figure 3. Focus of study 2.

In this study, 338 teacher education students who completed a mandatory, assessed group task in self-generated groups of three to five members were asked about their appraisals of group work based on their former experience with group work at the beginning of the collaborative learning setting and about their learning emotions during the group learning situation. The research question was: How do students' appraisals of distinct dimensions of the group assignment resulting from their experience with group work predict their emotions in a group work environment?

Appraisals were measured with the SAGA (Volet, 2001a) which measures students' appraisal of group work in five dimensions: Cognitive Benefits, Motivating Influence, Assessment, Management and Interpersonal. Emotions were measured with a newly developed instrument (Wosnitza & Kimmel, 2010) with three scales: Positive Activating Emotions, Negative Activating Emotions and Negative Deactivating Emotions. Multiple regression analyses were carried out to examine whether students' multi-dimensional appraisals of the group assignment serve as significant predictors for students' emotions.

The results of the multiple regression analyses revealed that students' multi-dimensional appraisals of the task at hand predicted 60% of the variance in positive activating emotions ($R^2 = 0.60$, $F(5,333) = 97.50$, $p < 0.001$), with Motivating Influence making the strongest contribution ($\beta = 0.60$, $p < 0.001$), followed by Cognitive Benefits ($\beta = 0.17$, $p < 0.001$). Moreover, students' multi-dimensional appraisals of the group assignment also accounted for more than half of the variance in negative deactivating emotions ($R^2 = 0.58$), which was highly significant ($F(5,333) = 92.04$, $p < 0.001$). Motivating Influence ($\beta = 0.30$, $p < 0.001$) and Assessment ($\beta = 0.25$, $p < 0.001$) demonstrated the strongest significant effects on negative deactivating emotions, while Management ($\beta = 0.17$, $p < 0.01$) and Cognitive Benefits

($\beta = 0.10$, $p < 0.05$) also made significant contributions. Finally, the multiple regression analysis revealed that students' multi-dimensional group work appraisals predicted only 8% of the variance in negative activating emotions (R^2=0.08, $F(5,333)=6.28$, $p<0.001$), with the Interpersonal dimension being the only significant predictor ($\beta = 0.32$, $p < 0.001$).

Overall, this study shows how prior experience and appraisals have an influence on the learning process and more specifically how appraisals based on experiences can predict students' emotions in group work.

Study 3: Co-regulation of Group Work Learning Processes

Study 3 is a pilot study[1] investigating how students co-regulate their learning process in a problem based cooperative learning environment (Figure 4). Groups of five and six students studying a problem in the context of a unit in the Bachelor program in Industrial Education were video-recorded. All participants were female. The data were analyzed using a coding system which describes dimensions of regulation processes in cooperative learning settings by Volet, Summers and Thurman (2009), who distinguish between:

- high level co-regulation – various group members are mutually developing new knowledge
- high level individual-regulation – one group member is developing new knowledge
- low level co-regulation – various group members define or clarify aspects and questions regarding the task
- low level individual regulation – one group member defines or clarifies aspects and questions regarding the task.

One of the research questions of this study was to find out whether all successful groups regulate their learning process similarly. It was postulated that successful groups are groups with regulation processes that are dominantly of the type "high level co-regulation".

The results show that this is not the case. All groups showed different amounts of *high level regulation* processes. They lay between 21.0% and 33.8% of all coded incidences. *High level co-regulation* lay between 7.0% and 16.0% and *high level individual regulation* between 14.1% and 24.8%. All other incidences were coded as *low level individual* or *co-regulation* or *organization of the task*. Overall, the analyzed groups were very different regarding the way they regulated their group learning process but were all on task (in average only 4% off-task behavior). What can be said is that all groups that solved the task successfully were using *high level regulation strategies* although it is not the dominant regulation strategy. The study furthermore shows that it is necessary to take a more detailed look into group processes in order to understand what is really happening when groups are regulating their learning processes. This requires a broader methodological approach since

survey studies alone, as often used when analyzing regulation strategies (see also study 1), can only scratch the surface of this phenomenon.

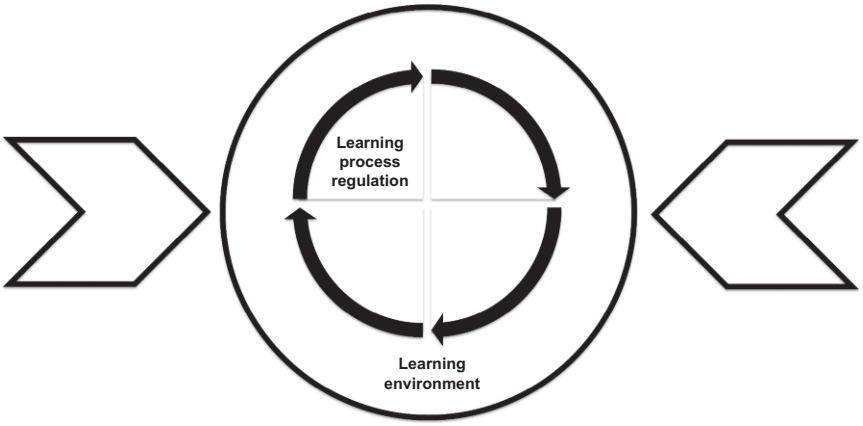

Figure 4. Focus of study 3.

DISCUSSION

Universities have increasingly become places of vocational education and training and thereby places in which students gain a professional qualification. This development could in a way be considered an estrangement of Humboldt's university concept. For Humboldt, higher education only marginally implied the gain of content knowledge but above all the individual development of personality and general education ("allgemeine Menschenbildung"). In a report to king Friedrich Wilhelm III. in 1809 he wrote:

> Fängt man aber von dem besondern Berufe an, so macht man ihn einseitig, und er erlangt nie die Geschicklichkeit und Freiheit, die nothwendig ist, um auch in seinem Berufe allein nicht bloss mechanisch, was Andere vor ihm gethan, nachzuahmen, sondern selbst Erweiterungen und Verbesserungen vorzunehmen (Humboldt, 1809/1996, p. 218).
>
> […but if one starts with the special profession, one makes it one-sided to oneself and it never reaches the skillfulness and autonomy that would be necessary in one's job not only to imitate mechanically what others have done before but to carry increments and improvements out oneself…].

This idea is known today under the terms *key qualification* or *generic competencies* and constitutes a central requirement in all systems of vocational education and training. Even if Humboldt was opposed to the idea of a professional qualification at universities, his idea of an "allgemeine Menschenbildung" ["general education of humans"] is as relevant to vocational education today as it was in his days.

One other aspect can be found in Humboldt's concept: Precondition of any education is the presence of autonomy and the freedom from constraints and force or, in our words, the possibility to self-regulate one's learning processes. For that, universities have to be places of self-regulation and autonomy and our universities are exactly that. Despite the criticism that teaching at universities – with some exceptions – is still dominated by lectures, the predominant part of studying at university clearly is self-regulated by each and every student him- or herself. The studies presented in this paper discuss some different aspects of these self-regulated learning processes and show the interaction of the individual learning process including its motivational, cognitive and metacognitive elements with the learning environment in which the learning process takes place. It furthermore discusses the relevance of individual pre-conditions for this learning process to be successful.

The studies presented here also indicate the potential of linking research in teaching and learning research to educational theory. What Humboldt postulated as autonomic identity formation of the learning individual gains its instructional potential in models of self-regulated learning. This also is exactly the appropriate reading of Max Weber's analyses of the professionalism of research in the twenty-first century. Universities are places of internal and external vocational education, since they foster students to become autonomous academics and are based on established models of self-regulated learning.

NOTE

[1] Wosnitza, M., & Zölß, A. (in prep.). *Co-regulation processes in group work. A video analytical approach*.

REFERENCES

Beck, K., & Breuer, K. (2002). Cultures of Vocational Education and Training in respect to Flexibility, Transferability and Mobility. In K. Breuer, & K. Beck (Eds.) *Are European Vocational Systems up to the Job Evaluation in European Vocational Systems*. Frankfurt: Peter Lang, 9–20.

Bologna Working Group on Qualifications Framework (2005). *A Framework for Qualifications of the European Higher Education Area*. Copenhagen: Ministry of Science, Technology and Innovation.

Breuer, K. (1992). Unterrichtskonzepte zum selbständigen Planen und Durchführen komplexer Arbeitsaufgaben. In G. Tulodziecki, K. Breuer, & A. Hauf (Eds.) *Konzepte für das berufliche Lehren und Lernen* (3rd ed.). Bad Heilbrunn: Klinkhardt & Handwerk und Technik, 203–225.

Breuer, K. (2002). Kompetenzdiagnostik in der beruflichen Bildung – eine Zwischenbilanz. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 102*, 194–210.

Breuer, K., & Brahm, T. (2004). Die Abbildung von Befähigungen zur Selbstregulation. In M. Wosnitza, A. Frey, & R. S. Jäger (Eds.) *Lernprozess, Lernumgebung und Lerndiagnostik. Wissenschaftliche Beiträge zum Lernen im 21. Jahrhundert*. Landau: Empirische Pädagogik, 363–374.

Breuer, K., & Eugster, B. (2006). Effects of training and assessment in vocational education and training (VET): Reflections on the methodology of assessing the development of traits of self-regulation. *Studies in Educational Evaluation, 32*(3), 243–261.

Breuer, K., & Tennyson, R. D. (1995). Psychological Foundations for Instructional Design Theory: Cognitive Complexity Theorie. *Journal of Structural Learning, 12*, 165–173.

Bundesassistentenkonferenz (1970). *Forschendes Lernen – Wissenschaftliches Prüfen. Ergebnisse der Arbeit des Ausschusses für Hochschuldidaktik. Schriften der Bundesassistentenkonferenz 5*. Bonn.

Candy, P. C. (1991). *Self-direction for lifelong learning: A comprehensive guide to theory and practice.* San Francisco: Jossey-Bass Publishers.

Eugster, B. (2004). Selbststeuerung und Selbsttechnologie: Soziologische Bemerkungen zur Subjektivität in Lehr-Lehr-Arrangements. In M. Wosnitza, A. Frey, & R. S. Jäger (Eds.) *Lernprozess, Lernumgebung und Lerndiagnostik. Wissenschaftliche Beiträge zum Lernen im 21. Jahrhundert*. Landau: Empirische Pädagogik, 14–25.

Eugster, B. (2011). Die Einheit von Forschung und Lehre. Eine Anmaßung. In M. Weil, M. Schiefner, B. Eugster, & K. Futter (Eds.) *Aktionsfelder der Hochschuldidaktik. Von der Weiterbildung zum Diskurs*. Münster: Waxmann, 237–250.

Hickey, D. T. (1997). Motivation and contemporary socio-constructivist instructional perspectives. *Educational Psychologist, 32*, 175–193.

Humboldt, W. v. (1809/1996b). Bericht der Sektion des Kultus und Unterrichts an den König Dezember 1809. In W. v. Humboldt (Ed.) *Werke IV: Schriften zur Politik und zum Bildungswesen* (5. ed.). Stuttgart: Cotta, 210–238.

Joint Quality Initiative (2004). *Shared 'Dublin' descriptors for Short Cycle, First Cycle, Second Cycle and Third Cycle Awards. A report from a Joint Quality Initiative informal group.* Retrieved 05.06.2012 from http://www.jointquality.nl/ge_descriptors.html.

Kimmel, K., & Wosnitza, M. (submitted for review, 2012). *Emotions in group work: Insights from an appraisal-oriented perspective.*

Konrad, K. (2005). *Förderung und Analyse von selbstgesteuertem Lernen in kooperativen Lernumgebungen. Bedingungen, Prozesse und Bedeutung kognitiver sowie metakognitiver Strategien für den Erwerb und Transfer konzeptuellen Wissens.* Lengerich: Pabst.

Nenniger, P. (1999). On the role of motivation in self-directed learning: The 'two-shells-model of motivated self-directed learning' as a structural explanatory concept. *European Journal of Psychology of Education, 14*(1), 71–86.

Oevermann, U. (2005). Wissenschaft als Beruf. Die Professionalisierung wissenschaftlichen Handelns und die gegenwärtige Universitätsentwicklung. *Die Hochschule - Journal für Wissenschaft und Bildung, 14*, 15–49.

Reich, K. (2006). *Konstruktivistische Didaktik. Lehr- und Studienbuch mit Methodenpool.* Weinheim: Beltz.

Schelsky, H. (1971). *Einsamkeit und Freiheit. Idee und Gestalt der deutschen Universität und ihrer Reformen* (2. ed.). Düsseldorf: Bertelsmann Universitätsverlag.

Stichweh, R. (1994). Die Einheit von Lehre und Forschung. In R. Stichweh (Ed.) *Wissenschaft, Universität, Professionen. Soziologische Analysen*. Frankfurt: Suhrkamp, 228–245.

Straka, G. A. (2001). Selbstgesteuertes akademisches Lernen und die Qualität der Lehre. *Empirische Pädagogik, 15*(2), 305–322.

Volet, S. (2001a). Significance of cultural and motivation variables on students' attitudes towards group work. In F. Salili, C. Chiu, & Y. Hong (Eds.) *Student motivation: The culture and context of learning*. New York: Kluwer Academic/Plenum, 309–333.

Volet, S. (2001b). Understanding Learning and Motivation in Context. A Multidimensional and Multilevel Cognitive-Situative Perspective. In S. Volet, & S. Järvelä (Eds.) *Motivation in learning contexts: Theoretical and methodological implications*. Amsterdam: Pergamon Press, 57–82.

Volet, S. E., Summers, M., & Thurman, J. (2009). High-level co-regulation in collaborative learning: How does it emerge and how is it sustained? *Learning and Instruction, 19*(2), 128–143.

Weber, M. (1922/1988). Wissenschaft als Beruf. In M. Weber, *Gesammelte Aufsätze zur Wissenschaftslehre*, (edited by J. Winckelmann, 7. ed.). Tübingen: Mohr, 582–613.

Wosnitza, M. (2000). *Motiviertes selbstgesteuertes Lernen im Studium: Theoretischer Rahmen, diagnostisches Instrumentarium und Bedingungsanalyse.* Landau: VEP.

Wosnitza, M. (2004). The mediating role of the perceived learning environment for the self-direction in learning. In M. Wosnitza, A. Frey, & R. S. Jäger (Eds.) *Lernprozess, Lernumgebung und Lerndiagnostik. Wissenschaftliche Beiträge zum Lernen im 21. Jahrhundert*. Landau: VEP, 306–319.

Wosnitza, M., & Beltman, S. (2012). Learning and Motivation in Multiple Contexts: The Development of a Heuristic Framework. *European Journal of Psychology of Education*, *27*, 117–193.

Wosnitza, M., & Eugster, B. (2001). Die Entwicklung individueller Lern- und Kontrollstrategien im Rahmen des Ausbildungskonzeptes „Kleinunternehmen". H. Heid, G. Minnameier, & E. Wuttke (Eds.) *Fortschritte in der Berufsbildung? Aktuelle Forschung und prospektive Umsetzung.* (Zeitschrift für Berufs- und Wirtschaftspädagogik, Beiheft 16). Stuttgart: Steiner, 141–146.

Wosnitza, M., & Kimmel, K. (2010). *Emotionen beim Lernen und Arbeiten in der Gruppe (ELAG-DT Version 0.5)*. Aachen: RWTH, Institut für Erziehungswissenschaft.

Wosnitza, M., & Zölß, A. (in prep.). *Co-regulation processes in group work. A video analytical approach.* Aachen: RWTH, Institut für Erziehungswissenschaft.

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TRAINABILITY, VOCATIONAL SKILLS AND EMPLOYABILITY

Different Stories Relating to Basic Skills and Work Virtues?

INTRODUCTORY REMARKS ON A VERY "GERMAN" DEBATE

The following refers to the discussion about what young people looking for training places should have to offer just at the beginning of their entry into the system of vocational education and training. On the one hand, the discussion of trainability ("Ausbildungsreife") is a very "German" one. It refers to a long tradition related to unskilled workers ("Jungarbeiter"), goes back to the 1920s and had an intensive culmination in the 1960s to 1980s. This led to actual concepts with differentiated lists of criteria and features about how providers and consumers should use the term "trainability". On the other hand, advances in European unification have introduced new lines of argumentation, like the debate on employability, into the German context. The question investigated in this article is to what extent actual concepts of trainability are influenced by these lines of discussion, implicitly or explicitly.

In the next section a short introduction to the general context of this discussion is presented, followed by the explication of the key categories like "Beruf" (profession) and "Beruflichkeit" (professionalism) in the German debate (third section). Subsequently, the main lines of the debate on employability are pointed out (fourth section) before critical analyses of actual German concepts for trainability are presented (fifth section). In the sixth section are reflections about vocational skills between formal vocational training policy making and empirically based structures. Finally, the considerations presented in this article close by bringing to mind critical reflections about the crucial relationship between vocational education and training and the requirements of the labor market (seventh section).

SKILLS NEEDED FOR WORK AND EMPLOYMENT INVOLVING VARIOUS INTERESTS AND LINES OF DISCUSSION

The development of skills in vocational training and in employment provides a key focal point for various institutional groups as well as for those seeking such training. These groups include vocational and educational policy makers, employers, employee representatives, non-governmental providers, professional schools and

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last but not least young people in education and training. Given the increasing networking in employment markets and the attempt to create politically agreed conditions for managing this networking in the European Union, the European debate is exerting increasing influence on the traditions relating to each nation state (for labor market developments see e.g. Belke, 2011; Statistische Bundesämter der Länder, 2012). These influences are becoming more prevalent, and this is happening against the background of increased pressure on skills profiling (for vocational training see e.g. Descy & Tessaring, 2000; Baethge, Achtenhagen, Arends, Babic, Baethge-Kinsky & Weber, 2006). Efforts are being made to ensure that the agreed European qualification framework is subject to national regulatory frameworks. The political agreements might make it possible to achieve and safeguard equivalent transnational and national outputs in learning at educational institutions, enable comparisons for informal learning, and provide arrangements for their formal recognition, facilitating transnational mobility in training and work.

The significantly different structures in national labor markets and employment systems, on the one hand, and in vocational training systems on the other, require close management of the terms chosen for these international statutory frameworks. This is not only reflected in the transnational European context but it also becomes evident in the debates taking place in each country and in decisions in the fields of regional vocational and educational policy as well as economic and employment market policy (c.f. e.g. the contributions in Brockmann, Clarke & Winch, 2011). However, the study by Brockmann, Clarke, Winch, Hanf, Méhaut & Westerhuis (2011) shows that this venture entails some practically insoluble problems.

In Germany, particularly when looking at the output from state schools, we see intensive expert policy advice and the effects of this advice on developments in policy decision making; this affects the definition of educational standards as well as the setting up of organizations for carrying out surveys to monitor learning throughout parts of the country. In the area of vocational training and the related regulatory framework, we could almost talk of "resistance to advice" in the relevant processes of negotiation and political decision-making vis-à-vis expert advice (c.f. e.g. reactions to the feasibility study of Baethge, Achtenhagen et al., 2006).

In view of these complex and controversial conditions and interests, we can focus on the issue under discussion on at least two levels, i.e. on the vocational and educational policy level, on the scientific level of defining and measuring competences and skills, as well on the interaction between these two levels. This also raises the question of how and in what way the two levels interact. Dewe (2009) describes these processes as a concept cycle, Brosziewski (2009) as "semantic shifts in the ways the education system defines itself".

The following discussion focuses on the policy level, while being aware that this might curtail the view of the overall subject. The issue of reliable and valid assessment of the competences acquired in education and employment requires theoretical models and related tools for assessing these competences, and will not be considered here. These models are tools suitable to the specific competences, the associated

performance and the contexts of education and employment (see also e.g. Winther, 2010; Nickolaus, 2011; Nickolaus, Abele, Gschwendtner, Nitzsche & Greiff, 2012).

PROFESSION ("BERUF") AND PROFESSIONALISM ("BERUFLICHKEIT") – KEY CONTROL CATEGORIES IN GERMAN DEBATES

Work ethics ("Arbeitstugenden"), extra-functional skills, employability, trainability ("Ausbildungsreife"), vocational skills ("berufliche Kompetenzen") and vocational aptitude ("berufliche Handlungsfähigkeit") – the list of terms mentioned in the context of this discussion could certainly be expanded. Against the background of the European debate, it is obvious that even for basic terms such as "knowledge", "competence" and "skills" it is very difficult to find suitable translations (see e.g. Brockmann, Clarke, Winch, Hanf, Méhaut & Westerhuis, 2011, pp. 168ff.). The translation of German terms into English and vice versa remains particularly precarious (see e.g. Méhaut, 2011 for differences with the French).

"Beruf" – Key Concept for the Provision of Training and Employment and for Users and Employees

Reuling (1998) and Hanf (2011) examine the European debates on work-related competences, skills and abilities; for these authors the word "Beruf" denotes a very specific German debate (see e.g. Greinert, 1998; Lipsmeier, 2000; Raeder & Grote, 2005; Lempert, 2006). This leads to profound and, to a certain extent, irreconcilable terminological and conceptual differences, for example, looking at the German and the English terms for "competence" and "skills".[1] In the German tradition, the concept "Beruf" and the vocational training and the regulatory policy structure associated with it have a key management function (see e.g. Arnold & Gonon, 2006, pp. 72ff.). This applies especially to the organization of processes of allocation, particularly the transition from secondary education into the vocational training system, and the integration into the employment system.[2] The significance of "Beruf" is associated with the ever-dominant role of the dual system of vocational training (see e.g. Datenreport zum Berufsbildungsbericht, 2011, A3.1; Hoeckel & Schwartz, 2010). Furthermore, it arises from the fact that despite obvious structural changes the profession-based organization of the labor market and employment system plays a key role in Germany (see e.g. Apitzsch, 2010).

According to Kurtz (2005, p. 89), the notion of "Beruf" is "still an important structural component of the life course" (see also e.g. Corsten, 2001; Lauterbach & Weil, 2009). In this sense, "Beruf" for the majority of the population remains a significant factor in terms of providing purpose, a means of engaging and participating in society and offering wide scope for individuals to interact socially. It also functions as a "source of self-esteem and self-image" (Kurtz, 2005, p. 89; see also Lubecki, 2002). In his biographical study Heinz (2002) points out various ways in which the individual relates to his/her "Beruf", career etc. He also shows that

"Beruf" provides a highly significant pattern of orientation that is largely intact. For Geißler and Geramanis (2001, pp. 41ff.) the term "Beruf" is problematic in that it facilitates the control of allocation processes to secure privileges associated with status. Although Lempert (2006) takes a critical view of "Beruf", he still recognizes the important function of this concept for providing order, assignment and identity.

Professionalism ("Beruflichkeit") – A Guiding Principle Interlinking Vocational Training and the Employment System

When we look at the increasing dynamics in the labor market, particularly with regard to the restructuring of workplace structures and processes affecting many sectors and industries, it is difficult to distinguish the different workplace structures reliably by using the category of "Beruf" (see for example Spöttl, 2005; Petersen, 2008). There is also a growing danger of the aforementioned dynamics disengaging the curricular redesign of vocational training from the rhythms of transformation. And there is the risk, too, of offering "obsolete" content that has diminishing objective and subjective relevance to the self-image and self-esteem of the student looking for vocational training.

In this context, the concept of professionalism ("Beruflichkeit") has a dual function:

(a) It is aimed at the process of systematic alignment as regards the organization of defined requirements in activities and processes, on the one hand, and the highly regarded competence structures of the employed person on the other (see e.g. Rauner, 2005, pp. 14f.). According to Rauner's theories on "open and dynamic" professionalism, young people and young adults encounter this in the area of vocational training processes in their education and further training; employees experience professionalism as part of their activities in the workplace. If employment, however, takes place in so-called "unusual working conditions", the actual realization of professionalism ("Beruflichkeit") and the contribution it makes to safeguarding vocational training processes becomes extremely fragile.[3] Given the changing dynamics in the employment system indicated here, professionalism might, according to Rauner, have no precise determinable "exterior". It functions as a framework of orientation providing a tremendous asset related to a socially accepted maxim (for a critical view see e.g. Geißler & Geramanis, 2001, pp. 51ff.). With regard to the multi-level model of Bronfenbrenner (1981), theories on professionalism apply from the macro-system level across the various system levels to the micro-system level.

(b) According to Rauner (2005, pp. 14f.), professionalism ("Beruflichkeit") manifests itself not least in the fact that cross-professional activities and the carrying out of such activities in the workplace and cross-professional competences are not only "tolerated" but actively taken on board. The latter provide important interfaces both for the successful completion of training in recognized training-based occupations

("anerkannte Ausbildungsberufe") and the acquisition of vocational skills as well as for the successful development of the courses of careers and employment. One consequence of these considerations is the assumption that, on the level of vocational training, professionalism should find its conceptual differentiation in such phenomena as "trainability" and "vocational skills".

EMPLOYABILITY – EUROPEAN LINES OF DISCUSSION

The European Qualifications Framework as an Instigator for the European Dissemination of the Concept of Employability

The following has recently become clear from looking at the creation of the European Qualifications Framework (EQR) and the National Qualifications Framework (NQR): As a result of developments instigated by the European Union, there is mounting pressure to ensure that results of educational and training systems can be compared, as well as any skills acquired by individuals through their work activities. In order to achieve this, a politically negotiated and "economically manageable" regulatory framework was set up. It should be used in such a way that the outputs from learning and working might be compared in sufficiently reliable terms (see e.g. articles published by the Bundesministerium für Bildung und Forschung, 2005; Arbeitsgemeinschaft Betriebliche Weiterbildungsforschung, 2006; Gnahs, 2011, in particular pp. 74ff.). For these considerations, economic and labor market considerations formed a striking point of departure. They are based on a key conceptual understanding of what is meant, for example, by "jobs" and "occupations" and to a lesser extent "trades" (see e.g. Clarke, 2011). Considerations regarding "Beruf" and the profession-based organization of the labor market play almost no role.

The criticism of the politically negotiated categories and their significance is obvious, relates to the conceptual design of key categories, and is relatively sharp (see e.g. "Fachlicher Prüfbericht zu den Grundbegriffen und Deskriptoren des Entwurfs für einen Europäischen Qualifizierungsrahmen" dated 22nd May, 2006[4]). It is therefore not surprising that the ITB Working Group (2008) believes that the aim of the EQR to specify areas and cross-professional skills is empirically unsustainable. In their feasibility study, Baethge, Achtenhagen et al. (2006) put forward a proposal that describes the necessary preparatory work for developing such a framework; they highlight the fact that the process chosen with the EQR and the NQRs generates a purely formal point of comparison. However, it turns out that via the political acceptance of the EQR, concepts enter into national debates on skills auditing, on the one hand, and on the regulation of educational and training systems on the other. These are heavily oriented towards labor market policy. There is also a growing danger that the educational and training system will be subordinated to the needs and requirements of the employment system (see Heid, 1977 for a critical view of this issue).

Employability – Maintaining Work Force for the Internal and External Labor Market

The Anglo-American debate on employability, in particular, and the ideas associated with it, are very significant for vocational educational policy (see for example Powell, Bernhard & Graf, 2011, p. 2). With the implementation of the NQR, here of the German Qualifications Framework, one might assumption that the discussion on employability will exert increasing influence on the German debate, too. Against this background it is not surprising that the ideas addressed in the EQR are used as a basis for defining the terms "competence" and "skills" (see e.g. Brockmann, Clarke & Winch, 2011). Moreover, there is an obvious link to the current debate on "key skills" in the context of work and work-related activity (see e.g. Nijhof & Streumer, 1998; Bahl, Camerer et al., 2009). Almost sequentially, primarily education- and training-based concepts on key competences and skills like that of Mertens (1974), which has influenced the German debate for a long time (see e.g. Thoma, 2011, pp. 117ff.), can attract only marginal significance in this European wide discussion (see also van Buer, 2012).

The debate on employability has led to a wide range of definitions and ideas (see e.g. McQuaid & Lindsay, 2005, p. 199). The conceptual clarifications vary considerably depending on whether they focus more on (a) the characteristics of those seeking employment or those in employment or more on (b) the supply of work and workplace structures or more on (c) the interaction between (a) and (b) (see e.g. McQuaid & Lindsay, 2005, pp. 197ff.). De Vos and De Hauw (2010, p. 6) highlight the following: In the concept of employability, the viewpoint of the labor market is usually taken relatively strictly, both with regard to the external labor market and the internal (company) labor market (for the latter see e.g. Geiger, 2012). Learning as a systematic approach to working conditions plays no role, and is probably the investment in learning that the individual has to make. Overall, there is a group of economically based concepts. These are used in relation to employment policy (such as the integration of unskilled workers into the employment system; see e.g. McQuaid & Lindsay, 2005, pp. 197f.) and at the level of the individual company. In their paper, which is published as part of the series of Official Publications of the European Communities, Pacelli, Devicienti et al. (2008, p. 14) describe employability as the

> ability of workers to remain attractive for the labour market in terms of their skills and qualifications, by reacting and anticipating changes in tasks and the work environment, facilitated by the human resources development opportunities offered to them. [Overall this is about] marketability of individuals' cumulative skills.

Informal learning at the workplace is certainly 'implicated' implicitly, in some concepts explicitly (see e.g. Gnahs, 2011, pp. 36f.; for informal learning at the workplace see the study by Frieling, Bernard, Bigalk & Müller, 2006). In these concepts, however, the responsibility of making the workplace an attractive pool of human

resources (see e.g. Arocena, Núnez & Villanueva, 2007) is still essentially understood as an input the individual is responsible for and has to bring to the workplace. The focus is on skills, abilities, attitudes etc. which are regarded in horizontal terms (economy, industry and trade) and in vertical terms (simple work to complex work structures) as being non-specific to the workplace. Cotton (1993, pp. 3f.) factors in:

(a) basic skills such as reading, writing and basic mathematical skills
(b) problem-solving skills, creative thinking and ability to learn and
(c) affective and motivational characteristics such as willingness to take on responsibility, positive attitude to work etc.

There is also regional mobility and willingness to compromise (concession of economic requirements for employment; see also the German study by Apel & Fertig, 2009).

The question is to what extent there are similar forces at work in the "German" concepts of trainability and vocational skills, providing indicators for a European convergence of vocational training and labor market policy discussions.

TRAINABILITY AND VOCATIONAL SKILLS – TERMINOLOGY BETWEEN THE DESIGNATION OF "TRADITIONAL" WORK VIRTUES AND PSYCHOLOGICALLY BASED CHARACTERISTICS OF PERFORMANCE

By approaching the questions above, we might expect an answer that draws our attention to the peculiarities of the German debate which in particular defines the boundaries of the debate on employability, boundaries that are created to address the concepts of "Beruf" and "Beruflichkeit" and the dual system of vocational training.

The "Young Workers' Debate" – a "Stable" Basis for the Current Discussion on Trainability?

The debate on what constitutes successful learning in vocational education and successful integration into employment once again became topical in the 1960s. At that time, the keywords were "young workers" or unskilled workers ("Jungarbeiter"). The debate also raised questions regarding the training they needed or might need in the vocational schools (see e.g. Abel, 1960; Höhn, 1974). In the 1980s the debate was again resumed about the Weimar Republic regarding those who were not competent enough to work or the youth that was not "ready for work" (see e.g. Seubert, 1984). In their report on trainability, Dobischat, Kühnlein and Schurgatz (2012, pp. 13ff.) emphasize the change of perspective since at least the 1970s in the relevant debates, a change which has made an impact on the debate on employability: It is about the relativization of the importance of the quality of training programs the companies should establish to offer to trainees versus the increased emphasis on the degree of trainability young people should offer to companies.

Relevant studies on young or unskilled workers, such as those by Kuhlmeyer and Blume (1966), Jaide (1969), Godehart (1972), Griesewelle (1977), Schweikert (1979), Bunk and Schelten (1980), Kloas and Stenger (1980), Kloas (1981) etc., draw attention to the following (for a differentiated study see Höhn, 1974; for a critical evaluation of these studies see Kell, van Buer & Schmidt, 1984): The relevant publications almost all highlight inadequate levels of knowledge; and for large numbers of young people they indicate major shortcomings particularly in regard to "work virtues" required for the job by the training provider and subsequently by the job provider (see the title of the study by Möller, 1966). The main thrust of the debate on young workers that took place between the 1960s and the mid 1980s focussed on shortcomings with regard to necessary work virtues. These were particularly apparent with applicants for training places with no basic or very limited school-leaving qualifications.

In many of the studies relating to unskilled workers, a critical analysis was made to identify what is meant by the term "work virtues" and what interest groups mainly point out as shortcomings (see e.g. Schwark, 1981; Seubert, 1984; also Kell, van Buer & Schmidt, 1984). In the debate on vocational educational policy, however, the impact of this critical thinking was barely noticeable. As a consequence, in the discussion on the conceptualization of "work virtues" in the sense of what young people should be able to offer to providers or enterprises the debate in ongoing (see Dobischat, Kühnlein & Schurgatz, 2012, pp. 68ff.). To the contrary, the pointed question what sustainable training quality the companies should offer developed nearly no active pressure. Compared with this, there was only limited impact on organizations to take tangible action (for conditions conducive to development of "work virtues" see e.g. Lempert, 1993; 2011).

The range of words used to describe what young people should be able to offer covers various "work virtues". This depends on the origin of the training sites or labor market sector. There is considerable semantic variety used depending on the place of work or training context. However, they all include the following: "readiness to work hard", "punctuality", "cleanliness", "discipline", "respect/ manners", "conscientiousness".

As the Swiss study by Stalder and Stricker (2009) illustrates, the above terms still carry a lot of weight. This is because – and this could be expressed as an assumption – they convey important everyday signals of communication. Furthermore, they also have a high level of acceptance (see Gaus, Hoffmann & Uhle, 2007) – almost in the sense of being society-based models for training and work.

The Concept of Trainability – a "Wish List" Used as a Meta-Framework?

As indicated above, one can regard the debate on trainability ("Ausbildungsreife")[5] as a response to the still unresolved problem of the unskilled. The fact is that over the last five decades in the Federal Republic of Germany there has been a significantly and consistently large group of young people who were subsumed under this term.

Society is and has responded to this in a variety of ways. The response includes a demand for more schooling (see e.g. Abel, 1960), increased choice of job-based training courses (see e.g. Bundesagentur für Arbeit, 2009) and the development of so-called non-theory based courses (see Bundesinstitut für Berufsbildung, 2012, Abbildung A4.3-2). Overall, in Germany, this led from the 1970s to the development of full-time training courses at vocational schools. Their numbers kept increasing until 2006 when they catered for approximately 680,000 young people. In 2009 they had approximately 499,000 young people, including approximately 410,000 young people in vocational schools following courses that did not lead to a recognized qualification (see Vocational training report of the BIBB, 2011, Figure A5.1.1). There is now a debate focussing on "a momentous (sub-)division of young people" (Dobischat, Kühnlein & Schurgatz, 2012, p. 45) between those who are not capable of being trained and those who are capable of being trained, and this debate can be followed in the latest publications (see e.g. Solga, Baas & Kohlrausch, 2012).

In vocational educational policy the "list of criteria for trainability" of the National Pact for Career Training and Skilled Manpower Development in Germany (see Bundesagentur für Arbeit, 2009) offers an attempt to define the concept of trainability using a set of so-called "critical" criteria, to each of which individual indicators are assigned; the words used for describing these characteristics that young people should dispose of as "indispensable" input features should be semantically binding (pp. 17ff.). Young people, parents, schools, careers guidance advisers and companies are mentioned as those to whom this concept is addressed (pp. 9ff.). Besides the requirement to standardize the use of the term, there is also an important self-imposed requirement relating to the setting up of the list (p. 17). However, this document fails to explain which scientific theories, models and scientific findings the group of experts is referring to.[6]

The list introduces "fundamental and essential basic features" (Bundesagentur für Arbeit, 2009, p. 18), which in the view of this group of experts must be present if a young person or young adult is deemed to be "trainable". However one judges the plausibility of the listed criteria, their nomination and specification is done without any further explicit justification. Even the reference to the Delphi Study by Eberhard (2006), which was apparently carried out in the context of the creation of this list, is no substitute for the empirical studies actually needed for the implied efficacy of the skills etc. mentioned in it for successful learning to take place in vocational training. The list of terms used in the Delphi Study offers a rarely qualified list of semantically undefined terminology which is then sorted into a significance ranking according to the frequency of match. There is then the obvious question as to whether this list offers more than formalized everyday understanding of skills, competences etc., that young people need for successful learning according to unspecified conditions of company-based training, or whether it simply provides information on the semantic similarities in terminology used in the everyday language of the respondent.

The group of experts puts the list of criteria for "trainability" into the context of two further conditions for the allocation of students to training places following

company training. These are the vocational interests of the consumers ("vocational aptitude") and the choice of training places and jobs in the regional contexts ("placeability"); but this group of experts does not clarify what these two concepts entail (Bundesagentur für Arbeit, 2009, pp. 12f.). Here the latter term is used to take account of the specific regional and local conditions of the market for training places and the individual company "in the sense of maximum suitability" (of the applicant) or because of company-specific characteristics (p. 16). In their study Ebbinghaus and Loter (2010) show how risky these criteria are because their use is often a determining factor in training places not being filled, although there is no empirical evidence to establish a link between this and the successful completion, change or failure of company-based training (see also Nickolaus, 2012, pp. 6ff.; Stamm, 2012, pp. 21f.).

The semantic breadth of the term "trainability" used in this list is evident in five areas, these being: "Basic Schooling", "Psychological Attributes", "Physical Attributes", "Psychological Characteristics of Employment Behavior", "Personality" and "Career Choice" (Bundesagentur für Arbeit, 2009, p. 17).

A total of 25 characteristics are listed in the five areas. Each one specifies a further ranking list comprising up to seven indicators. For example, the characteristic of "manners" which appears under "Psychological Attributes" lists five indicators (Bundesagentur für Arbeit, 2009, p. 54). The characteristic which has a first place ranking which is explicitly shown as the most important characteristic is:

> She/He uses the informal and formal terms of address ("Du" and "Sie") in the appropriate context.

This brief account leads to a critical review of the list (for a differentiated review see van Buer, 2012): In a designated vocational training policy tool, companies use institutionalized career guidance to control the processes of allocation at the first threshold and by graduates passing through the system. If we regard this as admissible to describe in the language of their everyday understanding of psychological traits the capacity of consumers, the foregoing in the concept of the Bundesagentur für Arbeit (2009), can be given very partial plausibility, perhaps, but definitely no scientific basis (see also Dobischat, Kühnlein & Schurgatz, 2012, pp. 52ff.). Overall, this list provides a document which sets out subjective theories on attributes deemed to be "essential" for the consumers to engage in successful learning and employment activity.

When we follow the intention of this team of experts the characteristics and indicators should have the function of providing at least an approximate understanding of the various interpretations users have of the term "trainability". However – and this may be expressed as an assumption – the goal stipulated by this concept, i.e. to regulate the use of the word "trainability", is hardly achievable using this approach. This is because, apart from the rough and partly contradictory semantics, the naming of these traits is decontextualized in two ways: (a) The different requirements of learning and development are not taken into account in the very diverse range of industries, professions and training-based occupations etc. (b) Features in

company-based contexts and the training place itself are not factored in either. The perspective taken is that of the unspecified training place provider. Therefore it is only a little surprising that, despite the updated lexicon, the list is based on a very traditional understanding of what young people have to offer in order to be assessed by company-based training providers or to be judged by the careers service as being "trainable".

This requirement of what young people have to offer comprises; the basic skills of "Spelling", (Bundesagentur für Arbeit, 2009, pp. 22f.), "Reading – dealing with texts and media" (pp. 24f.), "Speaking (oral communication skills)", "Listening (understanding the spoken word)" (pp. 26f.), "Basic numeracy" (pp. 28f.), "Basic knowledge of economics" (pp. 30f.) and "Work ethics", which largely focuses on the ability to integrate into a work environment. The notion of "value-based action", however, is not addressed at all. Roth (1971, e.g. pp. 87ff.) shows this to be a crucial aspect of mature and professional conduct. Consequently, not even the question of moral judgement is discussed which – according to Beck et al. (1997) – constitutes an important component of behavioural development (see also Beck, 2010; Minnameier, 2011).

In summary, the list of criteria may be regarded as a wish list that is normative, legitimized in a purely formal manner and empirically unsubstantiated in every conceivable way. Overall, there is little evidence of the theory outlined at the end of section about skills needed for work that considerations regarding "Beruf" and "Beruflichkeit" – based on the idea of vocational education and training being product and process at the same time (see Kell, 1996) – are incorporated into the collection of characteristics that apply to trainability as it is worked out by the Bundesagentur für Arbeit (2009). Instead it is expected that the list of criteria – if used as a significant conceptual management tool – provides a tool for training providers to help them to allocate places and to legitimize their allocation decisions.

VOCATIONAL SKILLS – A CONCEPTUALIZATION BETWEEN FORMAL VOCATIONAL TRAINING POLICY MAKING AND EMPIRICALLY BASED STRUCTURE

For the concept of trainability ("Ausbildungsreife"), there is no formal regulatory policy (see Berufsbildungsgesetz – BBiG[7]). The Vocational Training Act, for example, makes no provision for this; see also Handwerksordnung (HWO[8]). In contrast, this is not the case with vocational competence/skills ("beruflicher Handlungsfähigkeit"). According to BBiG § 3, "vocational skills" are formally attested for those completing vocational training (see also Reetz & Hewlett, 2008, pp. 23ff.). § 38 BBiG and § 32a HWO state that "vocational competence/skills" are a key component in the final examinations in vocational training (see also Frommberger & Milolaza, 2010). The Conference of the Ministers of Education (see KMK, 2007) bases the development of core curricula for teaching in vocational schools for recognized training-based occupations ("anerkannte Ausbildungsberufe") on the idea of activity-orientied

teaching and the development of learning areas ("Lernfelder") as a didactic structure. The purpose of this is to support the aim of ensuring that young people obtain vocational competencies/skills as part of their vocational training (for activity-oriented teaching see e.g. Gudjons, 2001; for the learning area concept see e.g. Tenberg, 2006; Buschfeld & Kremer, 2010; Riedl, 2011, pp. 144ff.).

As popular publications from the Federal Conference of the Ministers in Education (KMK) and the Federal Institute for Vocational Education (BIBB) show, the concept of vocational competence/skills is well established. Although both organizations are using it as a general target, it is not surprising that different interpretations are apparent when you compare the two (see, e.g., the diagrams in DEQA-VET, 2012). There is a very unclear picture as regards the idea of vocational competence/skills when we take a close look at vocational educational policy – not least because of the various authorities involved. Empirical studies such as those by Winther (2010) in the commercial area point to the measurement of competence. Studies by Abele, Greiff et al. (2012) and Nickolaus, Abele et al. (2012) highlight the acquisition of dynamic problem-solving skills by automotive mechatronic engineers and electronics engineers. These reveal preferred terms of empirical investigation relating to vocational training policy using testable constructs, extracting them from their purely normative context.

TRAINABILITY, VOCATIONAL SKILLS AND EMPLOYABILITY – TERMS RELATING TO TRADITIONAL IDEAS OF ADAPTATION IN MODERN EMPLOYMENT?

The material presented above shows at least two things: (a) In the discussions relating to vocational training and labor market policy, the conceptual indexing of skills required for the successful application for a (work-based) training place, the corroboration of vocational skills and employability play an important role for management and legitimisation of allocation processes – especially those at the transition point between secondary school and the vocational training system as well at the transition between the vocational training system and the employment system. As shown in the section about the concept of trainability, this indication is carried out to a large extent on the basis of everyday semantics embedded in the concept of trainability. The skills indicated in this concept refer on quite "traditional" notions of the providers of training and work of what characteristics of the consumers support successful learning in vocational training and help to carry out a successful period of continued employment. Empirically-based rationale of the choice of criteria and their ranking is not available and not used. What is striking is the intensive accentuation on what the young consumer is expected to bring to his/her training or employment, but not – or only to a limited extent – on what characteristics conducive to development of apprentices providers are expected to offer in their training places, work places and processes provided by them.

In regard to the discussion on "trainability", there is evidently a strong link to the debate in the 1960s to 1980s on young workers and the "work virtues" that were discussed in that context. High affinities to labor market policy based on employability concepts are apparent – possibly in contrast to the self-perception of organizational debaters in Germany. The latter emphasize what "attractive human capital" in the guise of those people seeking employment might bring to the internal and external labor market. The main difference between these two lines of argument therefore appears to be that the German notion of trainability is not aimed at work activity in work contexts but at learning activity in training contexts. Reliable evidence relating to basic schooling, attitudes and skills are the focal point of discussions on vocational education and training and labor market policy. These help facilitate the seamless integration of young people into training and work and promote regional mobility and the willingness to make financial concessions particularly when it comes to employability.

Recourse to the considerations of Roth (1971) that are already forty years old throw some light on the slant of the above-mentioned ideas. The "learning of value-based action" (e.g. pp. 389ff.) and its manifestation, for example, in moral-based judgement, is rarely discussed in normative-based lists and theories. Due to its affinity to the debate on skills and the development of training standards, the notion of vocational skills relates more to meta-cognitive management and the acquisition of reflexive skills. However, it does not appear that the debate on trainability and employability addresses these aspects, and so the somewhat reactive integration into training and work structures and processes remains the focus of consideration.

From a vocational, economic and educational perspective, Heid's critical discussion (1977) on a "relationship of superiority and subordination" between the requirements of the employment system and the choice of learning/training available in the vocational training system is still highly relevant in view of the above considerations. At least for the German debate, in this light it is the question of whether the concepts of "Beruf" (profession) and "Beruflichkeit" (professionalism) again might play an increasing role in the re-balancing of the different requirements of young people looking for training and work and of providers of training and employment.

This line of discussion concludes with a reference to the concept of key qualifications. Although Zabeck (1989) and others (see e.g. Thoma, 2011, pp. 117ff.) carry out a critical assessment, the compilation of key skills qualifications almost seems to be a pre-prepared counter proposal to the above stated scenario, as Mertens (1974, p. 40) has pointed out. Key skills qualifications entail:

> developing skills for lifelong learning and for changing social roles, disassociation using theorisation, creativity, relativisation, linking theory and practice, understanding of technology, interest analysis, basic understanding of social sciences, planning skills, communication skills, decoding skills, ability

to learn, ability to manage time and resources, goal setting, ability to work with others, perseverance, focus, accuracy, rational resolution of conflicts, reducing feelings of alienation, desire to achieve.

NOTES

[1] For a German language perspective, see, e.g., Hanf (2011). For an English language perspective, see, e.g. Winch (2011). For a general perspective see, e.g., Brockmann, Clarke et al. (2011).

[2] For a conceptual differentiation in the labor market and employment system see, e.g. Trinczek (2010).

[3] For the somewhat explosive quantitative developments in unusual working conditions, see e.g. Bundesagentur für Arbeit (2012, p. 11); Statistische Ämter des Bundes und der Länder (2012, p. 87).

[4] http://www.bibb.de/de/25717.htm, downloaded on February 6, 2012.

[5] The term "Reife" (maturity) is used in publications, e.g. by the Bundesagentur für Arbeit (The Federal Agency for Employment, see, e.g., Bundesagentur für Arbeit, 2009), but also in publications by the Bundesinstitut für Berufsbildung (The Federal Institute for Vocational Education – BIBB; see e.g. Eberhard, 2006). However, as it is not related to concepts and findings of developmental psychology, it is sensible to use the "neutral" concept of competence/skill instead ("Fähigkeit"; for a debate relating to the theory of youth see e.g. Fend, 2003; Stuhlmann, 2009; Kahlert & Mansel, 2007, and Rauschenbach & Bien, 2012; for transitions, e.g. the first threshold in terms a psycho-social moratorium with specific developmental tasks see e.g. Hurrelmann & Quenzel, 2012).

[6] The group of experts consisted of representatives from employers, the Bundesagentur für Arbeit (Federal Employment Agency), a vocational college and the Bundesinstitut für Berufsbildung (the Federal Institute for Vocational Education and Training). Representatives from trade unions and the consumers themselves were not involved.

[7] http://www.gesetze-im-internet.de/bundesrecht/bbig_2005/gesamt.pdf

[8] http://www.gesetze-im-internet.de/bundesrecht/hwo/gesamt.pdf

REFERENCES

Abel, H. (1960). Die Beschulung der Jugendlichen ohne Lehrverhältnisse. In F. Blättner et al. (Eds.) *Handbuch für das Berufsschulwesen*. Heidelberg.

Abele, S., Greiff, S. et al. (2012). Dynamische Problemlösekompetenz – ein bedeutsamer Prädiktor von Problemlöseleistungen in technischen Anforderungskontexten? *Zeitschrift für Erziehungswissenschaft*. Universität Stuttgart, Abteilung Berufs-, Wirtschafts-und Technikpädagogik. Stuttgart.

Apel, H., & Fertig, M. (2009). Operationalisierung von „Beschäftigungsfähigkeit" – ein methodischer Beitrag zur Entwicklung eines Messkonzepts. *Zeitschrift für Arbeitsmarkt-und Berufsforschung (ZAF)*, 5–28.

Apitzsch, B. (2010). *Flexible Beschäftigungsstrukturen, neue Abhängigkeiten: Projektarbeitsmärkte und ihre Auswirkungen auf Lebensverläufe*. Schriften aus dem MPI für Gesellschaftsforschung. Frankfurt: Campus.

Arbeitsgemeinschaft Betriebliche Weiterbildungsforschung (Ed.) (2006). *Edition QUEM. Studien zur beruflichen Weiterbildung im Transformationsprozess*. Münster: Waxmann.

Arnold, R., & Gonon, P. (2006). *Einführung in die Berufspädagogik*. Opladen & Bloomfield Hills.

Arocena, P., Núnez, I., & Villanueva, M. (2007). The effect of enhancing workers employability on small and medium enterprises: evidence from Spain. *Small Business Economics, No. 2*, 191.

Baethge, M., Achtenhagen, F. et al. (2006). *Berufsbildungs-PISA. Machbarkeitsstudie*. Stuttgart: Franz Steiner.

Bahl, A., Camerer, R. et al. (Eds.) (2009). *Kompetenzen für die globale Wirtschaft: Begriffe – Erwartungen – Entwicklungsansätze*. Bielefeld: Bertelsmann.

Beck, K. (2010). Gier, Scham, Stolz und andere "Bauchgefühle" – Moralische Emotionen im beruflichen Handeln. Reihe: *Arbeitspapiere WP, 61*. Lehrstuhl für Wirtschaftspädagogik der Universität Mainz. Mainz.

Beck, K. et al. (1997). Die moralische Urteils-und Handlungskompetenz von kaufmännischen Lehrlingen – Entwicklungsbedingungen und ihre pädagogische Gestaltung. *Arbeitspapiere WB*. Lehrstuhl für Wirtschaftspädagogik Universität Mainz. Mainz.

Belke, A. (2011). Wechselkursschwankungen, Außenhandel und Arbeitsmärkte. Neue theoretische und empirische Analysen im Lichte der Europäischen Währungsunion. *Wirtschaftswissenschaftliche Beiträge, Bd. 183*. Heidelberg: Physika.

Brockmann, M., Clarke, L. et al. (2011). Interpretative Dictionary: Competence, Qualification, Education, Knowledge. In M. Brockmann, L. Clarke, & C. Winch (Eds.) *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London: Routledge, 149–184.

Brockmann, M., Clarke, L., & Winch, C. (Eds.) (2011). *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London: Routledge.

Bronfenbrenner, U. (1981). *Die Ökologie der menschlichen Entwicklung*. Stuttgart: Klett.

Brosziewski, A. (2009). Von Bildung zu Kompetenz: semantische Verschiebungen in den Selbstbeschreibungen des Erziehungssystems. In T. Kurtz, & M. Pfadenhauer (Eds.) *Soziologie der Kompetenz*. Wiesbaden: VS Verlag, 119–134.

Buer, J. van (2012). *Berufsübergreifende Kompetenzen – Expertise im Rahmen der German National Educational Panel Study (NEPS).* Langfassung. Manuskript. Berlin.

Bundesagentur für Arbeit (2009). *Nationaler Pakt für Ausbildung und Fachkräftenachwuchs in Deutschland. Kriterienkatalog zur Ausbildungsreife*. Nürnberg.

Bundesagentur für Arbeit (2012). *Der Arbeitsmarkt in Deutschland. Zeitarbeit in Deutschland - aktuelle Entwicklungen. Arbeitsmarktberichterstattung* – Januar 2012. Nürnberg.

Bundesinstitut für Berufsbildung (2012). *Datenreport zum Berufsbildungsbericht 2011*. Bonn: Bundesinstitut für Berufsbildung (BIBB).

Bundesministerium für Bildung und Forschung (2005). *Kompetenzdokumentationen für informell erworbene berufsrelevante Kompetenzen.* Berlin: Arbeitsgemeinschaft Betriebliche Weiterbildungsforschung e. V.

Bunk, G. P., & Schelten, A. (1980). *Ausbildungsverzicht – Ausbildungsabbruch – Ausbildungsversagen. Jugendliche Problemgruppen unter empirischem Aspekt*. Frankfurt: Peter Lang.

Buschfeld, D., & Kremer, H.-H. (2010). Implementation von Curricula am Beispiel der Lernfeldimplementation. In R. Nickolaus, G. Pätzold et al. (Eds.) *Handbuch Berufs-und Wirtschaftspädagogik*. Stuttgart: UTB, 242–247.

Clarke, L. (2011). Trade? Job? Or Occupation? The Development of Occupational Labour Markerts for Bricklaying and Lorry Driving. In M. Brockmann, L. Clarke, & C. Winch (Eds.) *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London: Routledge, 102–119.

Corsten, M. (2001). Beruf, Inklusion und die Transformation der Arbeitsgesellschaft. In T. Kurtz (Eds.) *Aspekte des Berufs in der Moderne*. Opladen: Leske und Budrich, 265–286.

Cotton, K. (1993). *Developing Employability Skills. School Improvement Research Series*. Education Northwest.

Datenreport zum Berufsbildungsbericht des BIBB (2011). Retrieved 10.02.2012 from http://datenreport.bibb.de/html/3667.htm.

Descy, P., & Tessaring, M. (Eds.) (2000). *Training in Europe: Second Report on Vocational Training Research in Europe, 2000. Background Report. Vol. 1*. CEDEFOP Reference Series. Thessaloniki: European Centre for the Development of Vocational Training.

De Vos, A., & De Hauw, S. (2010). *Linking competency development to career success: exploring the mediating role of employability.* Retrieved 10.02.2012 from http://public.vlerick.com/Publications/41770ac2-6aa9-e011-8a89-005056a635ed.pdf.

DEQA – VET (2012). Berufliche Handlungsfähigkeit. Retrieved 15.03.2012 from www.deqa-vet/de/de/2412.php.

Dewe, B. (2009). Begriffskonjunkturen und der Wandel vom Qualifikations-zum Kompetenzjargon. In T. Kurtz, & M. Pfadenhauer (Eds.) *Soziologie der Kompetenz*. Wiesbaden: VS Verlag, 107–118.

Dobischat, R., Kühnlein, G., & Schurgatz, R. (2012). *Ausbildungsreife. Ein berufsbildungspolitisch ungeklärter und umstrittener Begriff in der Übergangspassage Jugendlicher von der Schule in*

die Berufsausbildung. Expertise für die Hans-Böckler-Stiftung Düsseldorf (Förderkennzeichen S-2011427-5). Unveröffentlichtes Manuskript. February 2012. Essen & Dortmund.

Ebbinghaus, M., & Loter, K. (2010). *Besetzung von Ausbildungsstellen. Welche Betriebe finden die Wunschkandidaten – welche machen Abstriche bei der Bewerberqualifikation – bei wem bleiben Ausbildungsplätze unbesetzt? Eine Untersuchung zum Einfluss von Struktur- und Anforderungsmerksmalen*. Bonn: BIBB.

Eberhard, V. (2006). Das Konzept der Ausbildungsreife – ein ungeklärtes Konstrukt im Spannungsfeld unterschiedlicher Interessen. *Bundesinstitut für Berufsbildung. Schriftenreihe, Heft 83*. Bonn: BIBB.

Fend, H. (2003). *Entwicklungspsychologie des Jugendalters*. 3. Auflage. Opladen: Leske und Budrich.

Frieling, E., Bernard, H., Bigalk, D., & Müller, R. F. (2006). *Lernen durch Arbeit. Entwicklung eines Verfahrens zur Bestimmung der Lernmöglichkeiten am Arbeitsplatz*. Münster: Waxmann.

Frommberger, D., & Milolaza, A. (2010). Kompetenzorientierte Prüfungen in der beruflichen Bildung in Deutschland – Entwicklungen, Anforderungen und Defizite. In H. Loebe, & E. Severing (Eds.) *Mobilität steigern – Durchlässigkeit fördern: europäische Impulse für die Berufsbildung*. Bielefeld: Bertelsmann, 117–132.

Gaus, D., Hoffmann, D., & Uhle, R. (2007). Pädagogische Redeweisen: sprachliche Anschaulichkeit und semantische Vagheit. In D. Gaus, D. Hoffmann, & R. Uhle (Eds.) *Mythen und Metaphern, Slogans und Signets*. Hamburg, 7–14.

Godehart, W. (1972). *Die berufliche Situation der Jungarbeiter*. Bonn: Dürr.

Geiger, D. (2012). *Der interne Arbeitsmarkt: Instrumente und Organisationsformen des internen Arbeitsmarktes*. München: AVM Akademische Verlagsgemeinschaft.

Geißler, K. A., & Geramanis, O. (2001). Beruflichkeit im Wandel. In H. Schanz (Eds.) *Berufs-und wirtschaftspädagogische Grundbegriffe. Band. 1*. Baltmannsweiler: Schneider, 39–53.

Gnahs, D. (2011). *Competencies: How they are acquired and measured*. Opladen: Budrich.

Greinert, W.-D. (1998). *Das „deutsche System" der Berufsausbildung: Tradition, Organisation, Funktion*. Baden-Baden: Nomos.

Griesewelle, D. (1977). *Jugendliche Arbeitlose und Jungarbeiter. Berufsbezogene Einstellungen und Verhaltensweisen berufsschulpflichtiger Jugendlicher in sogenannten Jungarbeiterklassen im Saarland*. Saarbrücken: Wirtschaftsvereinigung der CDU Saar.

Gudjons, H. (2001). *Handlungsorientiert lehren und lernen*. Bad Heilbrunn: Klinkhardt.

Hanf, G. (2011). The Relevance of the Beruf. In M. Brockmann, L. Clarke, & C. Winch (Eds.) *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London: Routledge, 50–67.

Heid, H. (1977). Können "die Anforderungen der Arbeitswelt" Ableitungsvoraussetzungen für Maßgaben der Berufserziehung sein? *Die deutsche Berufs-und Fachschule*, 833–839.

Heinz, W. R. (2002). Transition discontinuities and the biographical shaping of early work careers. *Journal of Vocatioal Behavior, No. 2*, 220–240.

Hoeckel, K., & Schwartz, R. (2010). *Lernen für die Arbeitswelt. OECD-Studien zur Berufsbildung*. Deutschland. Paris: OECD.

Höhn, E. (1974). *Ungelernte in der Bundesrepublik Deutschland – Soziale Situation, Begabungsstruktur und Bildungsmotivation*. Kaiserlautern 1974: Schriftenreihe der Georg Michael-Pfaff-Gedächtnisstiftung.

Hurrelmann, K., & Quenzel, G. (2012). *Lebensphase Jugend. Eine Einführung in die sozialwissenschaftliche Jugendforschung*. München: Juventa.

ITB Working Group (2008). Vocational education and training in Europe. An alternative to the European qualifications framework? *Journal of European Industrial Training, No. 2/3*, 221–234.

Jaide, W. (1969). *Junge Arbeiterinnen*. München: Juventa.

Kahlert, H., & Mansel, J. (Eds.) (2007). *Bildung und Berufsorientierung. Der Einfluss von Schule und informellen Kontexten auf die berufliche Identitätsbildung*. München: Juventa.

Kell, A. (1996). Berufsbildung zwischen Staat und Markt. In J. van Buer, D. Squarra, S. Seeber, & U. Apel (Eds.) *Entwicklung der Wirtschaftspädagogik in den osteuropäischen Ländern I - "Berufsbildung zwischen Staat und Markt*". Studien zur Wirtschafts-und Erwachsenenpädagogik aus der Humboldt-Universität zu Berlin. Band 9.1. Berlin: Humboldt-Universität zu Berlin, 7–39.

Kell, A., Buer, J. van, & Schmidt, A. (1984). Die Schülerpopulation im Vergleich. In A. Kell, J. van Buer et al. (Eds.) *Jugendliche ohne Hauptschulabschluss in der Berufsgrundbildung. Bd. 2*. Landesinstitut für Schule und Weiterbildung. Soest, 203–301.

Kloas, P.-W. (1981). Berufsstartprobleme und Maßnahmen zur Berufsvorbereitung und -ausbildung von Sonderschul-und Hauptschulabgängern. *Berichte zur beruflichen Bildung, Heft 17*. Berlin: Bundesinstitut für Berufsbildung.

Kloas, P.-W., & Stenger, H. (1980). Berufsschüler ohne Berufschance? *Schriften zur Berufsbildungsforschung, Heft 60*. Hannover 1980.

KMK (2007). Handreichung für die Erarbeitung von Rahmenlehrplänen der Kultusministerkonferenz für den berufsbezogenen Unterricht in der Berufsschule und ihre Abstimmung mit Ausbildungsordnungen des Kuhlmeyer, E., & Blume, O. (1966). *Die Ungelernten – ihre Herkunft, ihre Arbeit*. Göttingen: Schwartz.

Kuhlmeyer, E., & Blume, O. (1966). *Die Ungelernten – ihre Herkunft, ihre Arbeit. Ergebnisse einer Untersuchung über die wirtschaftliche und soziale Lage jugendlicher Arbeitnehmer ohne Lehr- oder Anlernvertrag*. Göttingen : Schwartz.

Kurtz, T. (2005). *Die Berufsform der Gesellschaft*. Weilerswist: Veebrücke Wissenschaft.

Lauterbach, W., & Weil, M. (2009). Ausbildungswege in den Arbeitsmarkt – Lohnen sich Mehrfachausbildungen für den beruflichen Aufstieg? In H. Fend, F. Berger, & U. Grob (Eds.) *Lebensverläufe, Lebensbewältigung, Lebensglück. Ergebnisse der LifE-Studie*. Wiesbaden: VS Verlag, 101–122.

Lempert, W. (1993). Moralische Sozialisation im Beruf. Bedingungsvarianten und -konfigurationen, Prozessstrukturen, Untersuchungsstrategien. *Zeitschrift für Sozialisationsforschung und Erziehungssoziologie, Heft 1*, 2–35.

Lempert, W. (2006). Der Beruf – ständisches Relikt oder einheitsstiftende Form moderner, funktional differenzierter Gesellschaften? Besprechung des Buches von Thomas Kurtz: Die Berufsform der Gesellschaft. *Zeitschrift für Berufs-und Wirtschaftspädagogik, Heft 2*.

Lempert, W. (2011). „Versöhnung der Gegensätze" im moralpädagogischen Universalismusstreit? Notizen zur bisherigen Entwicklung, aktuellen Anatomie und möglichen Metamorphose einer betagten Debatte. In O. Zlatkin-Troitschanskaia (Ed.) *Stationen empirischer Bildungsforschung. Traditionslinien und Perspektiven*. Wiesbaden: VS Verlag, 135–150.

Lipsmeier, A. (2000). Der Stellenwert des Berufskonzepts im Wandel der beruflichen Bildung, oder: Von der Beruflichkeit über die Berufsbildung zur arbeitsbezogenen Allgemeinbildung. In C. Metzger, H. Seitz, & F. Eberle (Eds.) *Impulse für die Wirtschaftspädagogik. Festschrift zum 65. Geburtstag von Prof. Dr. Rolf Dubs*. Zürich 2000, 111–132.

Lubecki, V. (2002). Biographische Analysen zum Verhältnis von Selbstwert und Beruf. *Forum Komparative Kasuistik, Studie Nr. 9*. Technische Universität Berlin. Berlin.

McQuaid, R. W., & Lindsay, C. (2005). The Concept of Employability. *Urban Studies, No. 2*, 197–219.

Méhaut, P. (2011). Savoir – The Organizing Principle of French VET. In M. Brockmann, L. Clarke, & C. Winch (Eds.) *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London: Routledge, 36–49.

Mertens, D. (1974). Schlüsselqualifikationen. Thesen zur Schulung für eine moderne Gesellschaft. *Mitteilungen aus der Arbeitsmarkt-und Berufsforschung 7*. Stuttgart: Kohlhammer.

Minnameier, G. (2011). Situationsspezifität moralischen Denkens und Handelns – Befunde, Erklärungen und didaktische Orientierungen. In O. Zlatkin-Troitschanskaia (Ed.) *Stationen empirischer Bildungsforschung. Traditionslinien und Perspektiven*. Wiesbaden: VS Verlag, 107–122.

Möller, C. (1966). *Die Einführung der ungelernten Jungarbeiterinnen in den industriellen Arbeitsprozess*. Meisenheim.

Nickolaus, R. (2011). Die Erfassung fachlicher Kompetenzen und ihrer Entwicklungen in der beruflichen Bildung – Forschungsstand und Perspektiven. In O. Zlatkin-Troitschanskaia (Ed.) *Stationen empirischer Bildungsforschung. Traditionslinien und Perspektiven*. Wiesbaden: VS Verlag, 331–351.

Nickolaus, R. (2012). Erledigen sich die Probleme an der ersten Schwelle von selbst? Strukturelle Probleme und Forschungsbedarfe. *Zeitschrift für Berufs-und Wirtschaftspädagogik, Heft 1*, 5–17.

Nickolaus, R., Abele, S., Gschwendtner, T., Nitzsche, A., & Greiff, S. (2012). Fachspezifische Problemlösefähigkeit in gewerblich-technischen Ausbildungsberufen – Modellierung, erreichte Niveaus und relevante Einflussfaktoren. *Zeitschrift für Berufs- und Wirtschaftspädagogik, Vol. 2*, 243–272.

Nijhof, W. J., & Streumer, J. N. (Eds.) (1998). *Key Qualifications in Work and Education*. Dordrecht, Boston: Kluwer.

Pacelli, L., Devicienti, F. et al. (2008). *Employment Security and employability: A contribution to the flexicurity debate*. Luxembourg: Office for Official Publications of the European Communities.

Petersen, A. W. (2008). Occupations and Occupational Areas. In F. Rauner, & R. Maclean (Eds.) *Handbook of Technical and Vocational Education and Training Research*. Berlin: Springer, 121–129.

Powell, J. J. W., Bernhard, N., & Graf, L. (2011). The Emergent European Model in Skill Formation: Comparing Higher Education and Vocational Training in the Bologna and Copenhagen Processes. *Sociology of Education, Heft 10*, 1–19.

Raeder, S., & Grote, G. (2005). Berufliche Identität. In F. Rauner (Ed.) *Handbuch Berufsbildungsforschung*. Bielefeld: Bertelsmann, 337–342.

Rauner, F. (2005). Praktisches Wissen und berufliche Handlungskompetenz. In *ITB-Forschungsberichte 14. Januar 2004*. Bremen: Universität Bremen.

Rauschenbach, T., & Bien, W. (Eds.) (2012). *Aufwachsen in Deutschland. AID:A – der neue DJI-Survey*. München: Juventa.

Reetz, L., & Hewlett, C. (2008). *Das Prüferhandbuch. Eine Handreichung zur Prüfungspraxis in der beruflichen Bildung*. Berlin: Ver.di.

Reuling, J. (1998). The German ‚Berufsprinzip' as a Model for Regulating Training Content and Qualification Standards. In W. J. Nijhof, & J. N. Streumer (Eds.) *Key Qualifications in Work and Education*. Dordrecht: Kluwer, 63–76.

Riedl, A. (2011). *Didaktik der beruflichen Bildung*. Stuttgart: Franz Steiner.

Roth, H. (1971). *Pädagogische Anthropologie. Band II. Entwicklung und Erziehung. Grundlagen einer Entwicklungspädagogik*. Hannover: Schroedel.

Schwark, J. (1981). *Jugendliche ohne Ausbildungsvertrag*. Dissertation. Siegen: Universität-Gesamthochschule Siegen.

Schweikert, K. (1979). *Fehlstart ins Berufsleben. Jungarbeiter, Arbeitslose, unversorgte Bewerber um Ausbildungsstellen*. Bundesinstitut für Berufsbildung. Bonn & Hannover.

Seubert, R. (1984). Jugendliche außerhalb der Lehre – zur Genese des Jungarbeiterproblems. In A. Kell et al. (Eds.) *Jugendliche ohne Hauptschulabschluß in der Berufsgrundbildung. Der Modellversuch zur Verbindung des Berufsvorbereitungsjahres mit dem Berufsgrundschuljahr in Nordrhein-Westfalen.* Curriculum Heft 34. Soest: Landesinstitut für Schule und Weiterbildung, 193–221.

Solga, H., Baas, M., & Kohlrausch, B. (2012). Mangelnde Ausbildungsreife – Hemmnis bei der Lehrstellensuche von Jugendlichen mit Hauptschulabschluss? *WZBrief Bildung 19/Februar 2012*. Berlin: Wissenschaftszentrum Berlin für Sozialforschung.

Spöttl, G. (2005). Sektoranalysen. In F. Rauner (Ed.) *Handbuch Berufsbildungsforschung*. Bielefeld: Bertelsmann, 112–118.

Stalder, B., & Stricker, C. (2009). Traditionelle Arbeitstugenden sind nach wie vor zentral. *Panorama, Heft 5*, 13/14.

Stamm, M. (2012). Zur Rolle des Betriebs beim Ausbildungsabbruch. *Zeitschrift für Berufs-und Wirtschaftspädagogik, Heft 1*, 18–27.

Statistische Ämter des Bundes und der Länder (2012). *Arbeitsmärkte im Wandel*. Wiesbaden.

Stuhlmann, K. (2009). Die Realisierung von Berufswünschen – Durch die Identitätsentwicklung im Jugendalter vorhersagbar? In H. Fend, F. Berger, & U. Grob (Eds.) *Lebensverläufe, Lebensbewältigung, Lebensglück. Ergebnisse der LifE-Studie*. Wiesbaden: VS Verlag, 73–99.

Tenberg, R. (2006). *Didaktik lernfeldstrukturierten Unterrichts. Theorie und Praxis beruflichen Lernens und Lehrens.* Hamburg: Handwerk und Technik.

Thoma, M. (2011). *Entwürfe des wirtschaftspädagogischen Subjekts. Anders-Konzeption aus poststrukturalistischer Perspektive*. Wiesbaden: VS Verlag.

Trinczek, R. (2010). *Beschäftigungssystem*. Erlangen-Nürnberg: FAU Erlangen-Nürnberg. Retrieved 25.02.2012 from http://www.soziologie.phil.uni-erlagnen.de/courses/2010/65-zum-wandel-desbeschäftigungssystems-deutschland.

Winch, C. (2011). Skill – A concept manufactured in England? In M. Brockmann, L. Clarke, & C. Winch (Eds.) *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London & New York: Routledge, 85–101.

Winther, E. (2010). *Kompetenzmessung in der beruflichen Bildung*. Bielefeld: Bertelsmann.

Zabeck, J. (1989). „Schlüsselqualifikationen" – Zur Kritik einer didaktischen Zauberformel. *Wirtschaft und Erziehung, Heft 3*, 77–86.

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CHAPTER II

CONTENT, OBJECTIVES AND OUTCOMES OF VET

KLAUS BECK

PROFESSIONAL ROLE REQUIREMENTS AND UNIVERSAL MORALS

INTRODUCTION

The enduring commercial and financial crisis that originated in the US and flashed over to Europe in 2008 raises a lot of serious questions not only about economic interrelations between nations but also on the behavior of political actors and financial managers in banks, hedge funds and other comparable enterprises. Everybody agrees that this crisis is not a natural disaster at all but rather a disaster made by human beings. And again, most people agree when it is stated that it is only a comparatively small group of actors who were responsible for the emergence of the severe and dangerous financial problems we now have to deal with all over the world. Indeed, they are sure that politicians and managers have brought about the actual fateful situation. They blame them for having profited illegitimately from risky business dealings and for ducking out of responsibility for the measureless losses tax payers now have to meet.

Of course, these things are much more complicated than is sketched out by these few sentences. But nevertheless they bring one central problem to the fore which is gaining more and more attention in the public discourse, i.e. the question of how far the responsibility of persons in certain functions reaches. Whereas one important question is which standards and rules are demanded by morality, another theatre of war is opened when it is asked whether different moral standards apply to different groups of societal actors.

By putting these questions in a very general form we are not only focusing on the politicians and managers in finance who certainly offer prominent examples for a discussion of this type. We may also think of the many less spectacular cases of occupational groups like clerks, priests, nurses, judges, engine drivers, teachers, insurance agents, apprentices and so forth. Are they subject to different moral rules or are morals one and the same for all human beings? As is generally known, there is a prevalent argument that morality is indivisible, i.e. that all people in all places and at all times are subject to the same moral principles.

This latter ethical position is known as moral universalism – a view held by the ancient Greeks, the medieval scholastics or the philosophers of the Enlightenment and still by their modern epigones. They claim that we are given – or can discover, or may decide upon – generally valid principles which shall command our

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 47–60.

moral acting in any situation. On the other side we meet with a position called particularism[1] which claims that obviously people all around the world feel constrained by very different moral rules and that this is not only a contingent matter of fact but a consequence of different equitable and equipollent cultural developments.

In this paper I want to plead for a third position which I shall call "systemic particularism". In doing so, I will use an argument that in the eyes of traditional philosophers violates a fundamental logical rule. Seemingly, I am going to stumble straight into the trap of the naturalistic fallacy (Moore) when I argue that fixing of moral standards in and for our modern world has to be founded on empirical findings – an argument which also seems to accord with common-sense thinking because we still stick to the idea that morals (have to) come first and that afterwards our actions will be judged in the light of previously and independently stated moral rules: in other words, that moral principles and rules cannot be derived from the realities. In the following I am going to outline a rationale that works the other way round, i.e. which is not infected by an explicit or implicit recourse to a divine moral law or a moral law drawn from pure reason (*ante rebus*) but is founded (of course not logically deduced) in the human condition of life in modern societies.[2] As a result we will see that there are differences in morals not only for different professions but also between different roles one and the same person has to play. From this it follows that we have to rethink the basics of vocational education with respect to its ethical foundations.

ROOTS OF MORALS

An Evolutionary Perspective

There are two weighty arguments in this context derived from the point of view of evolutionary theory. The first is a phylogenetic one. It argues that human moral feeling and thinking evolved in the early days of mankind when our ancestors faced two fundamental problems, firstly to organize the coexistence of a number of people within a tribe and secondly to optimize co-operation for the production of necessary goods. Members of a tribe gained comparative advantage over competing groups if they succeeded in effectively co-ordinating their life by rules. The better – i.e. the more efficient – the rules and the stricter their observance the greater the synergetic effects that could be achieved, e.g. in collective successful hunting, in crop and stock farming and, when the population reached the limit of the nurturing capacity of the earth, in the survival of a tribe which was more and more endangered by extinction (Lampe, 1970; Mohr, 1987; Wuketits, 1990).

For sure, rules were not invented by somebody who sat down and reflected on the best way to oblige his tribal sisters and brothers to follow a certain mode of thinking, feeling and behavior. Therefore this evolutionary approach has nothing to do with Hobbes or Rousseau's philosophy of the social contract. Rather we could say

that moral rules evolved or emerged without being invented deliberately by humans. They developed in the course of evolution which retained the best models providing higher "inclusive", i.e. tribal, fitness than others (Mohr, 1987).[3]

The second point is very close to the first, though it is neither the same nor logically implied by it. It is also of evolutionary character and makes two claims. The first is that at least some of the fundamental moral rules which were superior to others gradually diffused – during thousands of generations – in our genetic dispositions, so becoming something like fixed connected human behavioral inclinations to think and to act. Xenophobia on the one hand and charity to our relatives and neighbours on the other, prohibition of incest and also voracity, enviousness, contempt or disgust might be good and intuitively convincing examples for genetically driven and in a wide sense "moral" inclinations (Mohr, 1987; Rozin et al., 1999; Haidt, 2001).[4]

The second claim is that as human beings we are not only genetically disposed to several by and large fixed moral judgements but also to learn morals from birth onwards, that – in analogy to Chomsky's "*ideae innatae*" – we are genetically disposed to acquire the moral customs of the social setting in which we are born just as we are disposed to acquire its language. As a result, we usually "know" what in our culture is morally right and what is morally wrong. But usually the immanent reasons of this knowledge are not at our cognitive disposal: Though we know how to speak correctly we do not know the rules behind our mother tongue and though we know how to behave (feel, judge, act) in our society or group or sub-cultural clique we do not know the incitements behind our moral inclinations. This is true not only for the "learners", i.e. children and adolescents, but also for their "teachers", i.e. their parents, relatives and so on. At least an unknown but supposedly large proportion our moral thinking and judging, whether innate or acquired during early childhood, is predetermined by intuition and spontaneous judgement and not the result of conscious deliberation (Haidt, 2001).

To summarize so far, we are morally partially fixed and also partially flexible in that we are disposed to adapt to a culture (ontogenetic aspect) – the culture having evolved and having been differentiated under geographic, climatic and other natural conditions (phylogenetic aspect) as well (Casimir, 1993; Lampe, 1993; Cobabus, 2000). Speaking in terms of developmental psychology, we have deep innate moral roots: In early childhood we acquire by enculturation basic moral convictions which tend to be relatively stable during life-span. Contrariwise, during growing up, especially during puberty, we also learn to reflect on and to discuss moral topics in a more or less rational way. This latter issue has caught the most attention and the enduring and all-encompassing engagement of practical philosophers. But all our conscious moral thinking – including that of these philosophers – is still grounded in and tied back to our phylogenetic basis and our ontogenesis, which is not yet fully understood and perhaps will never be fully understood (von Hayek, 1996), comparable to an iceberg with its peak representing philosophical ethics and public or private moral discourse.[5]

Psycho-Social Facts

Lawrence Kohlberg's psychological theory of moral development and judgement, acknowledged worldwide, is based on Kantian philosophy (Carter, 1986; Siegel, 1986; Beck, 1990). Two assumptions integrated in Kohlberg's theory are especially the result of Kant's direct influence. First, the highest stage of moral development, i.e. Stage 6,[6] is nearly identical with Kant's Categorical Imperative (cf. Colby & Kohlberg, 1987). This means that – in Kohlberg's opinion – human moral thinking tends to develop to a principled universalistic approach following the idea of a generally valid and applicable rule.

Kant's anti-particularism is also incorporated in Kohlberg's theory. The idea of general applicability and validity is not only preserved for Stage 6 but incorporates all stages (cf. Colby & Kohlberg, 1987). He claims that a person at his or her particular moral stage of thinking, be it Stage 5 or Stage 1, uses the respective principle to decide morally under all circumstances at any time. In Kohlberg's psychological language a moral principle as a guideline for ethical reasoning rules moral thinking in the shape of a "structured wholeness" (Colby & Kohlberg, 1987, pp. 8–9) – the instantiation of enlightened rationality. In Kohlberg's view there is no room for preconscious intuitive moral judgments.

It is both interesting and systematically of high importance to trace the influence of this rationality principle on empirical research and the interpretations of its outcomes. To give one outstanding example: to measure the individual competence for moral judgement Kohlberg and his co-workers suggest: (1) to administer three or four "dilemma" stories, (2) to carry out a Moral Judgement Interview (MJI), and (3) to collect and analyse all – roughly – 25 to 40 moral arguments the interviewee is more or less forced to produce (cf. Colby & Kohlberg, 1987). During an interview her or his attention is drawn to different situations in which he or she is placed, virtually, by variation of the initial story.[7] Of course, the arguments may change from one variant to another with respect to its content. Nevertheless, from Kohlberg's theoretical point of view, an interviewee should rely without exception on one and only one stage principle, i.e. the highest one she or he has reached so far in her or his moral development. But in the empirical reality things do not work that unambiguously. Usually, by varying situations, one and the same person provides arguments on different stages. The question is how to deal with such findings.

Kohlberg invented the so-called "modal stage" as a "true" measure of a person's moral competence. He prescribed that only those answers count for a moral diagnosis which are on one and the same stage and take the greatest part of all answers given by an interviewee. All other arguments whether below or above the modal stage have to beignored as long as they range below 25 % of the weighted scores (cf. Colby & Kohlberg, 1987, p. 187).

There are still some more sophisticated mathematical rules for how to deal with different constellations of resulting answers (ibid.). They all aim at arriving at one and only one stage as the diagnosed competence of moral judgement. Ignoring the

cases of stage transition and focusing on the central point of Kohlberg's argument it turns out that by manipulation of authentic empirical findings (i.e. by neglecting arguments not in line with that of the modal stage) the theory – including its philosophical background – is immunized, i.e. the rationality principle seems to be corroborated. However, by proceeding that way certain deliberations for a given situation expressed by seriously reflecting persons are dropped and others are kept – a rather arbitrary strategy.

By a longitudinal study on apprentices in insurance companies we could show that the moral judgements of our interviewees varied in terms of Kohlberg's stages in a broad range (Beck et al., 1999). We presented four different conflict stories dealing with affairs in the contexts of family, friendship (peers), and company's external (market) and internal (team) relations. Without going into further details here (see Beck et al., 1999; Beck & Parche-Kawik, 2004[8]) we found that only low percentages of our interviewees stuck to one and the same judgement principle throughout all context variations (Table 1).

Table 1. Percentage of homogeneously judging cases (N = 495)

DOMAIN			
family	*peer*	*market*	*team*
27.2 %	21.8 %	25.4 %	19.1 %

Even when we drew their attention to the fact that they were making use of different moral principles they assured us that the reasons for their judgements had to be different when and because – in their eyes – the context changed substantively. To go one step further we can interpret even those results that seem to be homogeneous *sensu* Kohlberg as a more or less accidental coincidence of principally differentiated individual moral judgements (Beck et al., 1999). Given these findings we have some strong indicators for the assumption of moral particularism even within one and the same society. Of course, as a "moral universalist" one could still retort that this might be a matter of fact but that on the other hand from an ethical point of view this fact is not at all acceptable. Rather it could be diagnosed as a societally deficient state of moral affairs. This point will be discussed in some detail in the next chapter.

INDIVIDUALS IN MODERN MASS SOCIETIES

Systemic Structures

Turning back to the societal and professional side of the ethical problem we can apply an evolutionary perspective again and state that our modern mass societies are the result of a succession of developmental leaps from the tribes and clans populating the earth during the Pleistocene era (Mohr, 1987). With respect to morals, individuals in that early time were perfectly controlled by their families,

relatives and tribesmen – groups which included normally at most one hundred people (Siebenhüner, 2004, p. 26). Everybody could (and did) observe each other all day (and night!) and could react immediately to attempts to infringe the rules in force. The execution of sanctions, too, could be controlled easily and entirely. Within these relatively small groups everybody was well-known to each other (see Figure 1).

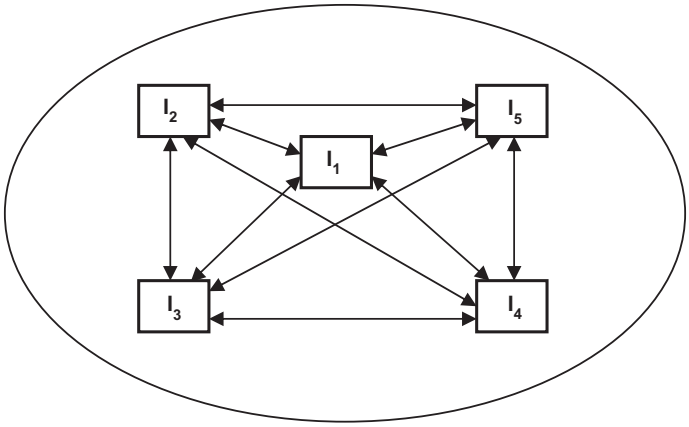

Figure 1. Social relations in traditional societies.

There and then, obedience to moral rules was not simply a question of intrapersonal thinking and willingness but also a matter of effective social control. Morals were not only taught by socialization. They were institutionalized and implemented efficiently by the simultaneous establishment of social control and a fine tuned sanctioning system (Eibl-Eibesfeldt, 1973; Wuketits, 1984, 1990; Mohr, 1987). Their primary function was not to help individuals to live virtuously (as many people claim and believe nowadays) but to make sure that the social group could exist and act successfully in an adversarial environment. Morals had the function to pledge group members to behave in a way conducive to the group's success.

Thinking of this scenario helps us to recognize and understand some ethically important changes which have taken place up to now. Today, normally, we live in huge mass societies. Social relations are often anonymous. By division of labor and specialization of social functions these societies have been split up into sub-systems, e.g. economy, law, religion, politics, welfare, education, communication (cf. Luhmann, 2006). The same happens at smaller scales. Sub-systems like the economy are split up into, say, production branches, service functions, the financial sector and so on, down to sub-sub-systems like the computer industry, catering, banks etc. and again further down to industrial plants, restaurants, savings banks and so forth. Analogously, in the education system we meet with an elementary sector, primary,

secondary and tertiary sectors and further down in scale with kindergartens, schools and universities. The communication system is divided into media, clubs, etc. but also chat-rooms and other virtual assemblies.

The important thing is that we as individuals are integrated in our societies by playing different roles which in turn are the functional elements of sub-systems (cf. Parsons, 1978; Luhmann, 2006). The sub-systems contribute to the overarching supra-system by producing a special output, e.g. goods and services (economy), law-based sentences (jurisdiction), earthly or heavenly orientations (churches, other ideological institutions), laws and rulings (legislative), health care (medical services), literacy (education system)and so forth. To fulfill their tasks they have developed specific internal structures which to a major part consist of functional rules and hierarchical arrangements of members.

From an individual perspective acts and rules specific to a given sub-system are nothing else than role expectations directed to persons who enter this sub-system willing (or being forced) to contribute to the production of the output specific to that sub-system. Again, the internal structure of any sub-system is permanently adapted by evolution to produce the output optimally. And it is almost unnecessary but nevertheless of major importance to add that, of course, each sub-system has developed its own specific "logic of production", i.e. sets of standards and structures of professional acts, equaled and mirrored by role expectations (cf. Luckmann, 1996; Luhmann, 2006).

In our societies one and the same person normally occupies not one or two but several or even many roles which are part of different sub-systems (see Figure 2). For instance, as mothers, fathers, or children, we hold roles within the sub-system "family", as teachers we participate in the sub-system "public education", as consumers we act in the economy, as voters we are part of politics, as clerks we belong to a company, as TV-watchers we are in the "entertainment system", as shareholders we play a role in the world of the stock exchange, as users of trains, planes, trams and undergrounds we enter the "traffic system", and as authors or readers of articles like the others in this book we are part of the sub-system "academia". There are hundreds of roles we can play. And – what is important – in each role we will meet different people who in turn meet different role players within their sets of roles.

Compared with the early days of humanity, and even to social arrangements up to the beginning of the modern era, one major difference is the following: From the perspective of the individual, we have to state that in present mass societies we live as the holders of roles integrated in different sub-systems, whereas in former times people lived and worked in a more or less holistic setting, being involved totally in an all-inclusive living environment (*Lebenswelt*). On the societal level the corresponding structures can be described as sub-systemic arrangements which absorb individual inclinations, suitability and competences to achieve their function as part of a whole, the supra-system. And these sub-systemic arrangements are organized in the shape of professions and vocations.

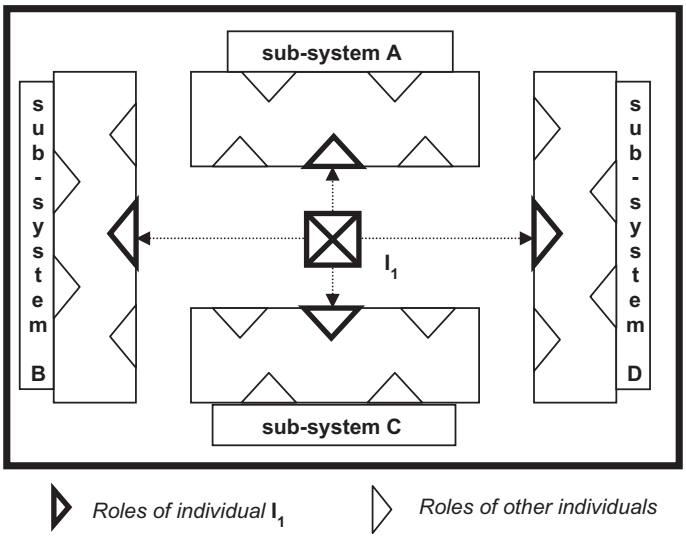

Figure 2. Integration of individuals in mass societies.

Implications for Morals

There is still one point left which has to be added to the present argument. The internal specific rules which the sub-systems have developed include not only "technical" algorithms but also moral prescriptions, the reason of which is grounded in the basic function and meaning of the respective sub-system. For instance, the ethical foundation on which the economic sub-system is built consists in justice of exchange, in a strategic orientation towards economic advantage by self-interested but nevertheless fair actions, and in observance of contracts. This moral concept reasonably matches Kohlberg's Stage 2 (see footnote 6). To deliberate along these ethical guidelines is morally justified because then the sub-system "economy" best meets its task in serving the supra-system by supplying goods and services and by saving resources.[9]

Hence, even selfishly motivated acts can be morally obliging given certain subsystemic role requirements (e.g. in a market economy) which, in turn, are grounded in the morally legitimate function of the sub-system as part of a supra-system. By contrast, within another sub-system, say welfare, a different foundation of moral rules has evolved. Playing a role in this functional setting is grounded on the idea of helping another person (or helping each other) to enhance her or his quality of life or prevent it from deteriorating. There are, of course, multiple fields or sub-subsystems where a moral imperative of this type is to be obeyed, e.g. schools, hospitals and homes for the aged, medical care and social work.[10] Very often the underlying motivation of role-conforming behaviour in these settings is erroneously identified

with "pure" morality as such. But it is better understood and more consistently modeled as fulfilment of role expectations, whether by free will or by more or less intensive social pressure. This moral segment might be represented best in terms of moral psychology by Kohlberg's Stage 3.

Two further functionalities establishing different moral orientations may be added. Firstly, we focus on organizational role acts in a broad meaning, for instance management activities in companies or communities, establishing law and order in traffic as well as in judicature, or implementing rules by interpreting laws in public areas or private domains. In short, the principle of this whole moral field resembles very much Kohlberg's Stage 4. And secondly, we have to think of the invention of rules,[11] again in a very broad sense, e.g. as a member of any type of parliament, be it in the realm of government or at lower levels in school boards or club committees or in the management of companies by implementing a corporate culture. This type of moral orientation is similar to Kohlberg's Stage 5.

All in all, we might differentiate at least four basic social functions (see Table 2) to which sub-systems, and respectively types of situations within sub-systems, could be subordinated under a moral perspective (Beck et al., 1999).

Table 2. Types of social constellations in terms of Kohlberg's hierarchy of moral stages

Social function	*Moral orientation (approx.)*
competition	Stage 2
co-operation	Stage 3
co-ordination	Stage 4
constitution	Stage 5

As a result, we can state that nowadays individuals are integrated in modern mass societies by social roles they have to play. These roles include role expectations which are "defined" within and by the respective sub-systems. Role expectations contain among other things specific moral obligations (Sommer, 1996; Steinvorth, 2002). Any bundle of role expectations formalized as functional within a given subsystem is also called a vocation or profession. Thus, under a moral perspective, our modern societies are based on the intrinsic concept of moral particularism.

As an ethical universalist one might deplore this state of affairs. But an attempt to impose universal moral rules obviously would end up in a collapse of the filigree structures of our systemic organized societies as well as of the cultural differences all over the world (Rappe, 2003; Zigon, 2008). Universal ethics erroneously implies that our complex world can be arranged and mastered by a few moral laws which claim unrestricted validity at any time in any place. Perhaps this might have been a meaningful idea for the human condition in past ages, but today we are in need of differentiated morals well adapted to the "logics" of the sub-systems which we enter partially and temporarily by playing the respective roles – i.e. systemic particularism.

IMPLICATIONS FOR THE MORAL BASE OF VOCATIONAL EDUCATION

Given the interpretation of the relationship between individual and society as sketched out above we are faced with the question of how we as "whole" individuals can cope with the fact of being "partialized" as role keepers acting in different subsystems where we have to adhere to different rules and values, particularly different moral commandments. Under such circumstances the objective to develop and to uphold an integrated coherent personality, i.e. a personal identity, seems to be in danger (Beck & Parche-Kawik, 2004). Indeed, in social sciences the phenomenon of being divided up into several roles is referred to by the notion of "patchwork identity" (Keupp, 1999).[12]

The question in vocational education is then how to deal with the requirement that young people have to learn to differentiate between types of situations they have to master (see Table 2) and to align themselves with the moral standards adequate for a given type of situation. It is not enough by far to draw their attention to institutional differences, e.g. between company, family, traffic, discotheque etc. Inside those institutions it is necessary to differentiate again, say, in companies between team situations, interactions with superiors, subordinates, customers, suppliers, public authorities etc. In all these interactions the content of the role varies to a greater or lesser extent including the moral rules to be observed.

Things get more complex if role conflicts come into the play, e.g. if one has to co-operate within a team but at the same time is aware that after finishing the current project one or more members of the team will be released, or if it is necessary to work overtime while one's spouse or children are expecting one to be at home, or if a new supplier offers goods at a lower price than that of his competitor with whom one has conducted business for a long time and who might be dependent on one's order. In all such cases to arrive at a solution it is necessary to decide on one of the roles involved to be enforced as predominant and to provide the criteria for a morally acceptable decision.

To keep oneself a coherent personality, there seem to be two strategies available. The first is to make young people in vocational education aware of the fact that they have to play different roles and to develop something like a "super ego" as the instance for deciding upon their choice of a situationally-adapted role concept. The second consists in selecting one role out of one's set of roles and endowing it with centrality, i.e. as "defining" one's identity. Presumably, every individual ranks her or his roles on a virtual scale ranging from "most central" to "peripheral" and, in case of doubt, prefers the rules, values and commandments of the higher ranked role. This ranking may be modified during the course of life especially during the different development phases to be passed in pre-adulthood.

Of course, normally all these processes will take place without the involvement of the consciousness. But it is a challenging task in vocational education to offer apprentices a cognitive access to them and to stimulate young people to reflect on them. Their developmental task in this phase of life is to integrate new and – with

respect to their social life – important roles as employees into their personality and to cope with new types of social situations and interpersonal conflicts they meet within the working world.

Usually, these occurrences are not recognized by apprentices as having a moral core and therefore they experience them superficially as disturbances to be understood in terms of strength and weakness or obedience and insubordination. But in most cases these are not appropriate categories to find acceptable interpretations and solutions for situations that are felt more or less clearly as problematic and conflictual. Therefore moral education in the context of vocational education has to introduce and to familiarize apprentices with categories suitable to describe and to analyze moral issues as conflicts of values. Furthermore it has to introduce an understanding of the fact that people have to play different roles and that each role is connected with more or less different expectations which have to be fulfilled as long as they are in line with rules and values inherent to the respective role. In terms of emotions they also have to learn to bear friction between different roles they have to play and that there is not always a clear and satisfying solution.

As sketched out above, in its social aspect life in our modern mass societies has become complicated and possibly it will become even more complicated in the process of globalization when, as a result of international mobility of the labor force, the range of values coming into the play is multiplied.[13] To stress it again, the idea of moral universalism which might have been adequate for the ancient conditions of living in hordes and tribes is obsolete at least since the advent of the modern era characterized among other things by the progression of division of labor – one of the reasons for the appearance of social roles.

Moral universalism holds that there are some few (if not only one[14]) basic and indubitable moral rule(s) to be observed at any time, at any place and under all conditions. This idea is no longer valid in our multifaceted living environment. Rather, by claiming absolute and unconditional obedience it has become dysfunctional in that it neglects the evolution and differentiation of systemic and sub-systemic cultures.

Nevertheless, at present universal moral positions are still claimed not only by religious communities, especially by fundamentalists of different faith groups, but also by many philosophers. Besides the awkward instance that they are not at all compatible with each other, they place people who are confronted with different role expectations unnecessarily in difficult positions which cannot be overcome by orientation to one and the same or to very few moral principles. Rather, we are in need of a systemic particularism in the foundation of morals which keeps up with the development of our modern societies.

Moral universalism is not helpful under the conditions of systemic structured environments. On the contrary, it overburdens individuals by obliging them to stick without fail to only one (or some few) rule(s). As a reaction many of them therefore tend to abandon moral reasoning at all, to drift morally through changes of mood or to relapse to crude Stage-1 egoism[15] (the latter being not at all consistent with the moral standards of the respective sub-systems) failing at the same time to develop

a consistent identity. This might have been the case with many politicians, managers and other professionals who seem to have lost any commitment to any moral value. The evolution of societies has already been complemented inwardly by the evolution of their systemic ethical bases while the majority view seems to pause at a stage which became dysfunctional long ago. All the more then is it the moral duty of vocational education to furnish young people with an adequate moral view of life which nowadays has to be founded in systemic particularism.

NOTES

[1] At this point we very often meet with the notion of "relativism" which, strictly speaking, is the opposite of a "claim to absolute validity", but "universalism" does not imply this claim.

[2] In other words – not mine but those of Karl Marx – I try to put professional ethics from its head onto its feet.

[3] This first hint of the evolutionary development of morals, which has received broad attention in the last, say, fifty years, goes back to the famous German Nobel laureate, Friedrich von Hayek (1996).

[4] Admittedly, up to now we do not yet know in detail which of our moral inclinations stem from genetic sources. On the other hand, and interestingly enough, some "deep" philosophers of morals after long and complicated reflection seem to detect nothing but our innate moral ideas – to put it in analogy to Noam Chomsky's "*ideae innatae*" (Chomsky, 1972).

[5] Konrad Lorenz (1973) showed that Kant's "categories", discovered and defined by him as the rational transcendental precondition of epistemological insight, is nothing else than the qualities of our evolved sensory organs, adapted to the physical world as our habitat.

[6] In short the stages are: 1. Obedience and punishment orientation; 2. Orientation to exchange and reciprocity; 3. Orientation to approval and helping others; 4. Authority and social-order orientation; 5. Contractual legalistic orientation; 6. Conscience and principle orientation.

[7] For instance, in the famous Heinz dilemma the interviewees have to reason whether they want Heinz to steal a drug for his beloved wife who is seriously ill. Afterwards they are also asked whether they are ready to steal for their friend, for a foreigner or even for a dog.

[8] In a re-analysis of Kohlberg's own data, Reuss and Becker (1996) found similar results.

[9] In short, to run a business at minimum cost, i.e. to strive for maximum returns, is nothing else than to spare resources, be they in the shape of material, capital or manpower.

[10] To be sure, a person working as a manager in a hospital acts as part of the sub-system "economy".

[11] Though nowadays we have many consciously developed rules, be they "technical" or moral, this does not change anything with respect to the culturally immanent hidden rules mentioned above.

[12] Often this concept is used in the context of describing postmodern youth as a state of being open to new and changing experiences in reconstructing and reordering one's identity. But it also fits very well in the state of the problem which is discussed here.

[13] Think of the "clash" of Christian and Islamic values, for instance.

[14] As e.g. Kant's Categorical Imperative states.

[15] Which might be adequate in some other sub-systems like some sports disciplines (e.g. boxing, Formula One) or other pure competitive arrangements.

REFERENCES

Beck, K. (1990). Philosophische Ethik als Basis moralpsychologischer Theoriebildung? Ein Beitrag zur Kohlberg-Kant-Kritik. In Strittmatter, P. (Ed.) *Zur Lernforschung: Befunde – Analysen - Perspektiven*. Deutscher Studien Verlag, 7–23.

Beck, K., Heinrichs, K., Minnameier, G., & Parche-Kawik, K. (1999). Homogeneity of Moral Judgment? - Apprentices solving business conflicts. *Journal of Moral Education, 28,* 429–443.

Beck, K., & Parche-Kawik, K. (2004). Das Mäntelchen im Wind? Zur Domänespezifität moralischen Urteilens. *Zeitschrift für Pädagogik, 50*, 244–265.
Carter, R. (1986). Does Kohlberg avoid relativism? In. S. Mogdil, & C. Mogdil (Eds.) *Lawrence Kohlberg. Consensus and controversy*. Philadelphia: Falmer, 9–20.
Casimir, M. J. (1993).Überlebensstrategien. Kulturen als Experimente. In DIFF (Ed.) *Der Mensch. Anthropologie heute*. Funkkolleg. Tübingen, 13/1–44.
Chomsky, N. (1972). *Language and mind*. New York: Jovanovich.
Cobabus, N. (2000). *Die vielen Gesichter von Moral und Ethik. Eine kulturphilosophische Studie*. Frankfurt: Haag & Herchen.
Colby, A., & Kohlberg, L. (1987).*The Measurement of Moral Judgment. Vol. I. Theoretical Foundations and Research Validation*. Cambridge, Mass. Cambridge Univ. Pr.
Eibl-Eibesfeldt, I. (1973). *Der vorprogrammierte Mensch*. Wien: Molden.
Haidt, J. (2001). The Emotional Dog and Its Rational Tail: A Social Intuitionist Approach to Moral Judgement. *Psychological Review, 108*, 814–834.
von Hayek, F. (1996). *Die Anmaßung von Wissen*. Tübingen: Mohr.
Keupp, H. (1999). *Identitätskonstruktionen*. Reinbek: Rowohlt.
Lampe, E. J. (1970). *Rechtsanthropologie. Eine Strukturanalyse des Menschen im Recht. Bd. I. Individualstrukturen in der Rechtsordnung*. Berlin: Duncker & Humblot.
Lampe, E. J. (1993). Woran wir uns orientieren. Normen und Gesetze. In DIFF (Ed.) *Der Mensch. Anthropologie heute*. Funkkolleg. Tübingen, 14/1–54.
Lorenz, K. (1973).*Die Rückseite des Spiegels*. München: Piper.
Luckmann, Th. (1996). Persönliche Identität, soziale Rolle und Rollendistanz. In O. Marquard, & K. Stierle (Eds.) *Identität* (2nd ed.). München: Fink, 293–314.
Luhmann, N. (2006). *Soziale Systeme. Grundriss einer allgemeinen Theorie*. Frankfurt: Suhrkamp.
Mohr, H.(1987). *Natur und Moral. Ethik in der Biologie*. Darmstadt: Wiss. Buchges.
Parsons, T. (1978). *Action Theory and the Human Condition*. New York: Free Pr.
Rappe, G. (2003). *Interkulturelle Ethik. Bd. I. Ethik und Rationalitätsformen im Kulturvergleich*. Berlin: Europ. Univ. Verl.
Reuss, S., & Becker, J. (1996). *Evaluation des Ansatzes von Lawrence Kohlberg zur Entwicklung und Messung moralischen Urteilens. Immanente Kritik und Weiterentwicklung. Materialien aus der Bildungsforschung*. Nr. 55. Max-Planck-Institut für Bildungsforschung, Berlin.
Rozin, P., Loewry, L., Imada, S., & Haidt, J. (1999). The CAD triad hypothesis: a mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity). *Journal of Personal and Social Psychology, 76*, 574–586.
Siebenhüner, B. (2004). Homo sustinens – von Theorie und Praxis. In U. E. Simonis (Ed.) *Jahrbuch* Ökologie *2005*. München: Beck, 26–35.
Siegel, H. (1986). Using psychology to justify judgements of moral adequacy. In S. Mogdil, & C. Mogdil (Eds.). *Lawrence Kohlberg. Consensus and controversy*. Philadelphia: Falmer, 65–78.
Sommer, M. (1996). Übergangsschwierigkeiten – Zur Konstruktion und Prätention moralischer Identität. In O. Marquard, & K. Stierle (Eds.) *Identität* (2nd ed.). München: Fink, 435–462.
Steinvorth, U. (2002). *Was ist Vernunft? Eine philosophische Einführung*. München: Beck.
Wuketits, F. (1984). *Evolution, Erkenntnis, Ethik*. Darmstadt: Wiss. Buchges.
Wuketits, F. (1990). *Gene, Kultur und Moral. Sozialbiologie – Pro und Contra*. Darmstadt: Wiss. Buchges.
Zigon, J. (2008). *Morality. An anthropological perspective*. Oxford: Berg.

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SITUATIONISM IN BUSINESS EDUCATION – ARE SITUATIONS THE SMALLEST DIDACTICAL UNITS?

BACKGROUND

The formulation and justification of learning goals is one of the major challenges confronting teachers (Meyer, 1975a). At the micro-level of teaching, this requires the formulation of what the learner should be able to do at the end of the class (Posch, Schneider & Mann, 1989, pp. 6–34). At the macro-level of curriculum development, we experience the "core issue of didactical reflections" (Beck, 1982, p. 140), i.e. the selection of those sections of the infinite, variegated real world that should be taught in classes (Meyer, 1975a; 1975b). This selection is based on the three criteria of curriculum relevance, i.e. science-orientation, character-orientation, and situation-orientation (Reetz, 2006, p. 57).

Up to the 1980s, the predominant criteria of curriculum relevance were those of neo-humanistic science-orientation and character-orientation (Reetz, 2006, p. 57). On this foundation, teaching was divided – in a first attempt of didactical reduction (Grüner, 1967) – into different professional domains, e.g. into a business or into a political education domain. By a second step, these domains were further segmented into different professional fields, like retail, insurance, and banking. Finally, these professional fields have been divided into different school subjects, like bookkeeping, internal accounting, and external accounting. Therewith, under this systemizing, the school subjects represented the smallest didactical unit. School subjects defined the learning goals; lessons were given within the boundaries of school subjects. The result was highly discipline-oriented lessons whose subjects often were unconnected to each other (Kell & Kutscha, 1977, p. 345). A consequence, especially in professional schools, was a lack of transferability of the acquired knowledge (Dubs, 2000, p. 15).

In contrast, in the past two decades, situation-orientation has become predominant, particularly in vocational education. In the mid 1990s, the learning field approach tried to improve vocational education through problem-based learning, which is grounded in the employment of realistic tasks from professional practice (Kultusministerkonferenz, 2007; Tramm, 2003, p. 2). While in the former, subject-oriented curricula the learning objects are structured by the different subjects, in the learning field approach a learning object is structured by different professional tasks (Dilger, Krakau, Rickes, Sloane & Tiemeyer, 2006, p. 3). Thus, learning at schools should no longer be based on a subject classification system resulting from

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 61–74.

the science-orientation criterion, but rather be based on the professional logic of actions. Therefore, the learning field approach can be understood as the curricular basis for problem-based learning in complex teaching-learning arrangements.

The introduction of the learning field concept was accompanied by a restructuring of learning contents. This structure now consisted of action fields, learning fields, and learning situations. Thus, the learning situation becomes the smallest didactical unit. On the one hand, the learning field approach is grounded in the theory that personal skills and competences are acquired mainly in a field-specific manner (Reetz, 2006, p. 61). On the other hand, the learning field approach is informed by the belief that knowledge becomes applicable only if combined with related situational aspects (Buschfeld, 2003, p. 2; Gerstenmaier & Mandl, 1995, p. 5; Sloane, 2003, pp. 4–6). However, it remains unclear what these situational aspects are and how individuals build a certain situation. First and foremost, from vocational business educational research, from overall educational research, or from educational psychology research it is still unclear how a situation is defined (Beck, 1996, pp. 87–88; Heid, 2001, p. 514). Researchers are confronted with a myriad of theoretical approaches to this notion, impeding the use of the construct of situation as a coherence-generating concept. Additionally, if it is unclear what situations are – in particular general and professional situations – it is difficult to deal with learning situations or even to construct them. Moreover, in the same vein, it seems difficult to identify the learning situation as the smallest didactical unit and to find out if the learning situation is indeed able to provide curricula with a structure.

Based on these reflections, this paper contributes to research by (1) providing a detailed systematization of the "situation" construct, and (2) discussing the consequences of a theoretically derived notion of situation on didactics. The remainder of the paper is set out as follows: the second section introduces a theory of the situation; the third section discusses the role of the learning situation as the smallest didactical unit; the final section describes the implications for business education in the construction of learning situations.

A SITUATION THEORY

Basic Assumptions

Based on an anticipatory approach, the didactic principle of situation orientation identifies those learning contents that will enable the learner to cope with future situations. Conversely, situation orientation implies the inference of learning contents from situations that should be dealt with (Robinsohn, 1972, p. 45). The notion of situation also plays a major role in business education and is thus referred to as the reference point of didactical reasoning (Beck, 1996, p. 87). Identifying ways of generating or developing dispositions that are required for addressing real-world situations has always been a fundamental concern of educators (Brezinka, 1995, p. 18). Therefore, the notion of situation is very commonly used. But at the same time its use is based on different interpretations. For example, the interpretation ranges from

an objectivistic (Parsons, 1967, p. 164; Laucken, 1995, p. 933) to a subjectivist one (Berger & Luckmann, 1993, pp. 60–64; for a review: Gerstenmaier & Mandl, 1995, pp. 15–28). Furthermore, these two interpretations are reconciled by an interpretation that regards both the internal perception as well as the external world as relevant (Esser, 1996, pp. 1–5).

The perspective adopted by the situation theory presented in this paper is grounded in this last interpretation. However, it also changes it in some areas. The situation theory on a structural level implies an interaction between the mental structures of an individual and external environmental influences (for a comparison of this perspective with other perspectives see Laucken, 1995, p. 933). Thus, situations do not "exist" as independent entities, but only as results of mental constructions that rely on perception and interpretation of what is perceived. The result of these perceptions is an individual interpretation of the world in which the individual acts. Thus, acting is the *consequence* of a subjective construction of the world: Individuals perceive environmental conditions, interpret these conditions by using their mental structures, and, from this interpretation, they develop a strategy of action. The result of this specific perception is a situation that delineates the boundaries of action. In summary, a situation is the result of an individual mental construction in which (1) the individual detects, based on mental dispositions and empirical conditions, a discrepancy between a given status and an intended status; (2) the individual compensates this discrepancy by appropriate action; and (3) the individual evaluates the success of this compensation.

Situations can be identified according to six aspects. These aspects are the interrelated structural elements that comprise a situation. These elements, based on Beck's 1996 approach, are "time", "object constellation", "conceptual approaches", "social role", "evaluation", and "goal and intention" (Beck, 1996; Bienengräber, 2012).

The Structure of a Situation

- "Time" refers to the duration of a situation. It cannot be denied that situations as subjective constructions stretch over a certain period of time. However, it is still debatable when situations *start*, how long they *last*, and when they *end*. Since situations are mental constructs, i.e. since situations arise from subjective construction, they are strongly related to the *present*. They arise from the actual experience of individuals. This raises the question about the duration of the present, i.e. the time required for the integration of two different stimuli. Based on the assumptions introduced in the last section, situations require a combination of different mental and external conditions that are accessible to subjective perception. Otherwise it would be impossible to define an intended target state of the real world on the basis of an analysis of a given state, since the definition of the intended target state necessarily implies changes from (and therefore is in connection with) a given, initial state. But if the initial and the intended target states are not integrated into one cognitive unit, there are only

two different, though independent, states (Pöppel, 1997, p. 57). Therewith, the ability to integrate the initial and the intended state into one unit is a prerequisite for perceiving the present. Building this unit means making the initial and the intended state accessible to experience (ibid., p. 65). The subjective present is thus based on an integration mechanism which is limited in time. This time limitation is determined by the point in time at which two events cannot be integrated anymore. The physiological boundary for this moment is about three seconds (Pöppel, 1997, pp. 63–65; Wundt, 1913, pp. 7). Therefore, due to the physiological capabilities of individuals, the subjectively perceived present can last a maximum of three seconds (Lehrl et al., 1982; Pöppel, 1997). These three seconds describe the time span of a so-called "basic situation", i.e. those discrete sections of a present that form each situation.

- "Object constellation" refers to memory and attention processes. It describes intra-psychic processes of selection which (1) choose those elements from the overall perceivable external environment and the mental long-term memory, both of which are needed for a currently intended action (Neumann, 1996; van der Heijden, 1996), and (2) temporarily store these elements in short-term memory.
- "Conceptual approaches" determine the objects that are actually used for the subjective construction of a situation. Therefore, conceptual approaches refer to the stock of knowledge from which an individual may profit, i.e. the perception and interpretation patterns that generate an individual's predisposition to accept certain types of information rather than others (Neisser, 1996, p. 26). The influence of these stocks of knowledge on the construction of situations is twofold. Firstly, conceptual approaches determine what can be perceived and thus which environmental conditions are available for the construction of the situation (and, *vice versa*, which are not; Albert, 1982, pp. 20–22; Neisser, 1996, p. 26). Secondly, conceptual approaches influence the subjective meaning attributed to a perceived object, i.e. they determine the way in which an object contributes to the construction of a situation.
- "Social role" refers, on the one hand, to the *capability* of an individual to adopt different social roles, and on the other hand to the *use* of this capability for the construction of situations. In the interpretation of role expectations arising from every social interaction the individual (1) has to *recognize* these expectations by its role-taking competence before (2) *deciding* if he or she is willing to meet these expectations. Herein the social role does not determine the concrete action, but predetermines, for the case of role-compliant behavior, the boundaries of action within which the individual is free in his or her decision about which actions to take.
- "Evaluation" allows the individual (1), according to certain criteria, to choose the action that is best suited to overcome the discrepancy between given and intended status, and (2) to decide if the intended status is "permitted" or "prohibited". In this process, different levels of analysis have to be distinguished. On a first level of analysis, the individual has to decide by an effectiveness criterion which actions are in principle suitable for achieving the intended status. Furthermore, an efficiency

criterion, within the actions that are in principle suitable for achieving the intended status, allows for identifying those actions that fit subjective preferences best. Finally, a moral criterion allows for deciding if the remaining possible actions should be actually implemented or not and if the intended status is actually desirable.

- Furthermore, "goal" and "intention" are two further elements indispensible for the construction of a situation. Both elements are inextricably linked to each other. Thus, in this paper they are differentiated only analytically, but generally they can be regarded as one single structural element of situation. While the goal refers to the desired outcome, the intention refers to the individual purpose of the implementation of a certain goal (Heckhausen, 1989, p. 214). The construction of a subjective situation requires the intention to achieve a certain status. Thus, the analytically distinguishable elements "goal" and "intention" are the starting point for the entire process of the construction of a situation.

Interdependencies between the Structural Elements of a Situation

The considerations related to the duration of a situation are only valid for basic situations – and thus entirely irrelevant for didactical purposes. In order to provide more detailed considerations concerning the end or the change of composed situations (cf. footnote 5), it is no longer sufficient simply to list the structural elements but rather their relationships should be investigated. The relationships between the six structural elements are summarized in Figure 1.

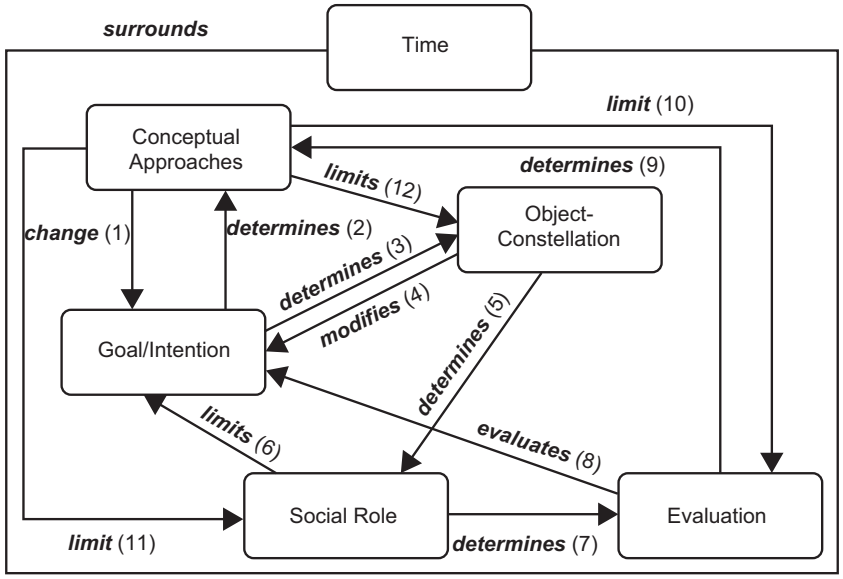

Figure 1. Interrelation of situational structural elements.

The starting point for the construction of a situation is the comparison of the diagnosed actual status with an intended goal status. This goal-setting process is strongly linked with the construction of an intention. Indeed, the motivation phase previous to the decision requires a balancing of different possible future intentions. Only after this step does a *certain* intention become a goal (Heckhausen, 1989, pp. 212–214). Accordingly, goal setting is dependent on the actual intention, thus allowing that goal and intention to become the starting point for the construction of a situation (cf. the figure for goal and intention).

The construction of the intention is, in turn, dependent on an individual's knowledge base and therewith on her or his conceptual approaches (cf. arrow 1 in the figure). If, for instance, a particular conceptual approach is not available, intentions including this concept cannot be constructed. In other words, an individual can only pursue goals he or she is able to perceive and to interpret. Thus, while the construction of a situation starts with the intention, the boundaries of this construction are delineated by conceptual approaches. At the same time the conceptual approaches are dependent on the intention, too. This is the case when the individual aims at expanding her or his knowledge bases towards a certain direction, i.e. when she or he learns new conceptual approaches (arrow 2). To do so, the individual must know what she or he wants to learn (this refers to the limited range of possible goals), but this intention directly influences the conceptual approaches.

The intention is aimed at realizing a goal, i.e. at the implementation of certain wishes within the external or mental world of an individual. Thus the object constellation is addressed (arrow 3). If in the phase before the decision a certain goal has been selected that drives the following individual action, this goal determines the orientation of the object constellation. As a result, the individual's attention is directed primarily to those elements that contribute to goal achievement, while other objects are ignored (Heckhausen, 1989, p. 204). The goal directs attention and thus object constellation.

The opposite direction is also possible because this direction allows the individual to react to unexpected events. Certain objects may attract the attention of an individual, possibly leading to a change in goal-setting and acting (arrow 4).[1]

The social role depends on the object constellation. The social role determines the individually perceived and interpreted expectations (arrow 5). The understanding of the current role is nurtured by the active interpretation of social conditions and thus arises from the perceivable world in terms of relevant objects. The individual perceives empirical facts, provides them with meaning with recourse to its conceptual approaches, and transforms them herewith into objects that are relevant for role determination.

At the same time, since the adequateness of certain goals may differ according to the social role taken by an individual, the social role influences goal and intention (arrow 6). Therewith, the social role is also connected with the criteria employed by an individual to evaluate the admissibility of an action in terms of effectiveness, efficiency, and morality (arrow 7), since particularly the evaluation of the admissibility

of an action is based on the social role adopted by an individual within a certain setting. Thus, the social role limits the range of possible actions, while the evaluation chooses the possible actions within this range, based on their effectiveness, efficiency, and morality (arrow 8).

Finally, conceptual approaches play a crucial role in the interdependence model, since they influence all other elements of this model. This deterministic function can be identified in the evaluation element. The quality of the evaluation of a goal or an action depends on the degree of an individual's cognitive development (arrow 9). For example, if the individual has a high competence of moral judgement, he or she can rely on those conceptual approaches that cannot be expected at lower levels of his or her competence in moral judgement. The same reasoning applies to the evaluation of effectiveness and efficiency. The knowledge an individual has at her or his disposal to evaluate the effectiveness and efficiency of actions limits the standards that can be used for this evaluation (arrow 10). Thus, conceptual approaches define the quality with which an individual is able to evaluate his or her own goals and actions. The same reasoning applies to the degree of development of mental structures in general. Thus, conceptual approaches also determine object constellation, since the quantity and degree of development of conceptual approaches depends on the quantity and quality of the objects an individual relates to a certain stimulus constellation (arrow 12).[2]

As a result of the same interdependence, conceptual approaches also determine the social role of an individual (arrow 11), since this social role depends on the subjectively available perceptual area, which in turn is represented by the individual's bundles of expectations. Thus, conceptual approaches limit the expectations an individual can attribute to him- or herself in a certain social role.

To sum up, conceptual approaches are a core structural element of a situation. This is due to the fact that they exercise a limiting effect on any other element, since they determine the quality with which an individual constructs a situation by integrating mental and external conditions. *Duration and state* of a situation depend on the intentions of the individual who is constructing a situation. By the intentional control of the gap between desired and actual conditions, the situation lasts exactly as long as the intended goal is achieved.[3] At the same time, the goal depends on the intentions of the individual. The other structural elements become involved in this process. Initially, the object constellation should be considered. On the one hand, it leads the individual, depending on her or his intention, to considering those objects that are required for the implementation of the intended action. On the other hand, the object constellation allows for directing one's attention towards new objects and even for formulating a new intention in the case of the occurrence of an unexpected constellation of stimuli. Furthermore, the object constellation may also influence the formulation of intentions indirectly through its influence on the definition of the social role of the individual.

Thus, *changes within a situation* arise from changes in the content of the structural elements, while *changes from one situation to another* are derived from changes of

goals. Changes in the content of subordinate structural elements are consequences of changed goals, not their causes (Beck, 1996, p. 94). An exception to this rule can be identified only with the object constellation that may react to unexpected stimuli by a change of motivation factors and thus may be able to revise the original goals. Therewith, an individual remains in the same situation as long as the content of those structural elements that influence the goal formulation remain unchanged. The situation ends when the individual has achieved her or his goal.

ARE SITUATIONS THE SMALLEST DIDACTICAL UNITS?

In the previous sections, the first research question about the notion of a situation and the structural elements has been answered. This third section is devoted to the second research question, i.e. if it is reasonable, based on this theory of the situation, to consider the (learning) situation the smallest didactical unit, and with which situations the learning field approach is dealing.

The learning field approach is made up of three components; action fields, learning fields, and learning situations. Action fields are complex professional fields of activity (Sloane, 2000, p. 81) that summarize particular professional tasks and are related both to professional and non-professional life. These professional tasks are not represented by separate and identifiable discipline contents but are rather professional assignments that require a holistic, interdisciplinary approach. Thus, action fields provide the boundaries within which apprentices have to deal with professional situations.

Learning fields lie within these boundaries. These learning fields are didactically developed action fields and thus represent genuine tasks that could occur within professional action fields and should be solved by proper acting (Kremer & Sloane, 1999, p. 6; Sloane, 2000, pp. 81–82; Dilger et al., 2006, p. 6). From apprentices they require the competence of actually being capable of solving the task. For example, learning fields could represent "situations" that could occur to a business clerk.[4] Thus, learning fields describe practical "situations"; learning should allow for *addressing* these practical "situations". A clear reference to situation orientation as a criterion for curriculum relevance can be identified at this point, since this criterion addresses the question of the qualifications (Robinsohn, 1972) that are required for coping with professional "situations".

The learning "situation", i.e. the third component of the learning field approach, represents the methodological implementation. The learning "situation" is the result of attempts to implement action fields in complex teaching-learning arrangements in terms of action-oriented teaching (Sloane, 2000, p. 82; Tramm, 2003, p. 2). Competencies that arise from the analysis of the learning field are taught (Bader & Schäfer, 1998, p. 230). Thus, the learning "situation" is the didactical unit *in which* or *on the basis of which*[5] teaching takes place.

With the learning field as the concrete professional "situation", two things are expected from apprentices. Firstly, they must be able to construct a certain situation

as described in the learning field on the basis of the occurrence of certain environmental conditions – and they must not construct another one. Secondly, they must possess the specific competencies that are necessary to address that special situation. Thus, according to the learning field approach, apprentices need to learn both a "construction competence" and a "coping competence". From a didactical point of view, this twofold expectation is problematic, since in the event of a failure of the learner the diagnosis of the cause is difficult. Has the student not acquired the necessary "coping competence" (e.g. the necessary field-specific knowledge), or has he or she simply not been able to construct the expected situation? From this different measures would follow, depending on the case which is relevant. While a lack of "coping competence" may be supposed to be relatively easy to teach (without going into detail regarding the didactical issues related to the competence aspect), a lack of "construction competencies" generates greater problems.[6]

Based on this reasoning, learning fields thus have a curricular implication: they represent the didactical units from which the competencies to cope with professional requirements are provided. In contrast, learning *situations* have methodological implications, since they are the didactical units *within which* learning occurs. When describing the structural element "time", I have already mentioned that a basic situation lasts for a maximum of three seconds. Of course, this duration is far too short to provide a basis for a didactical unit in which structured didactical acting takes place. However, these basic situations represent merely single sections on which *longer* situations are constructed. These longer situations arise from a perceived discrepancy between intended and actual reality (thus, the goal dimension is addressed). Therefore, based on this situation theory, the answer to the questions addressed at the beginning of this section is that the (learning) situation, understood as a multiple of the time span of consciousness, is the smallest didactical unit in which practical action is implemented.

ON THE CONSTRUCTION OF LEARNING SITUATIONS

The facts described in the previous section are only suitable for curriculum development in business education if implications can be drawn that are applicable to business classes. It is in this opportunity of providing the basis to construct learning situations in the context of the learning field approach that the potential of situation theory is shown. The situation as a didactical unit becomes particularly useful when the learning field, i.e. the future professional situation, and the learning situation refer to each other. If applied this way, situation theory can support the identification of those competencies from the learning field that are required by an apprentice in order to be able at least to construct certain situations – thus fulfilling the requirement identified in the situation principle (Robinsohn, 1972, p. 45). This would help to address the issue of the lack of learning transferability by the learning field approach. In order to achieve this goal, all six structural elements of a situation are *concretized*. The procedure will be demonstrated briefly in the following, by

two sample structural elements. Learning field 7 ("Private credit process") from the framework for the training of a bank clerk (Kultusministerkonferenz, 1997) is used as a reference.

- In this case the goal dimension can be described as the competence to make a certain part of reality a subjective desire, and to interpret it as a discrepancy between the initial and the target state that has to be overcome. Such a part of reality is, for example, a customer entering the bank and looking for advice.[7] In order to make this part of reality interpretable in terms of the required "construction competence" it is necessary to generate an overall interest of the apprentice in the counseling of customers. This builds the prerequisite to add this procedure to the "list" of all possible intentions that are, as far as an opportunity emerges, transformed into a goal. This includes the competence to interpret with the available or developable conceptual approaches the environmental conditions in a such way that their compliance with the related intention becomes evident. In other words, the apprentice needs the intention to counsel the customer, as well as the competence to identify a related opportunity in order to transform a related intention into a goal and, finally, to transform this goal into a related action (Bienengräber, 2012, p. 222).
- In the same manner, I can discuss the "social role" of business education. Following the mission statement of the firm, the "social role" can on the whole mostly be described as the ability to consult in a competent, friendly, and sales-oriented manner (Dubs, 1999, p. 448; von Stein & Gruber, 1999, p. 15). Such an understanding of the role of a bank clerk or customer counselor must be developed by an apprentice. He or she should also have the possibility to act according to this understanding of the role. These are the prerequisites to allow the apprentice to employ his or her competence to cope with the situation.

The curricular implications of the learning fields can be met by the identification of the competencies that allow for making the related concrete situation constructible. A more detailed content specification, e.g. for the application of the above mentioned mission statement, as well as the methodological implementation, i.e. support in the development of the necessary competencies, occurs by appropriate teaching-learning arrangements in the smallest didactical unit, i.e. in the learning situation. Due to the contextuality of knowledge, the particular challenge for the teacher lies in designing the learning arrangement[8] so that it will be most equivalent to the concrete professional arrangement, i.e. to the learning field. Thus, here also situation theory can provide a contribution. Moreover, situation-oriented education in the context of the learning field approach addresses an additional, fundamental requirement of a modern, competence-oriented professional education: Due to the structural description of situations that should be addressed within a certain domain, as well as with the content-based concretization of the required competencies, situation theory addresses not only the field of the acquisition of knowledge in terms of learning contents, but rather considers the additional dimensions of the notion of competence,

like skills, attainments, acting, experience, motivation, and volition (Weinert, 2002, pp. 27–28). If an apprentice possesses competences that are required for business "situations", both in terms of construction competence and in terms of coping competence, then he or she not only has the required knowledge but is also capable of applying this knowledge in a reasonable, responsible – and thus action-competent – way and of meeting the requirements he or she has to face in his or her profession.

NOTES

1 In the context of theories of attention, this effect direction between these elements is described by the term "regulation of psycho-physiological level of arousal" (Neumann, 1992, p. 93).

2 For example, an experienced chess player can attribute to a particular position of chess pieces the concept of "Spanish Opening", while to an individual without the appropriate conceptual approach the same position of chess pieces may appear random or obscure. Thus, the latter, as a chess player, may not have the opportunity to adopt appropriate actions in its construction of the situation in order to repel the attack from the competitor (Aebli, 1987, p. 82).

3 This time span is divided into basic situations lasting three seconds.

4 Referring to the learning field approach, the term "situation" is used in an objective meaning, contrary to the theory of situation. In this theory a learning situation is an exclusively mental construction by every student (and teacher), which cannot match totally in principle. If a teacher wants to construct a learning situation *for some student*, the only thing he or she is capable of is to shape the *external elements* which are perceivable (in a way he or she thinks (as a result of his or her own construction) they might fit together with the student's construction). In contrast, the learning field approach uses an objectivist position. Here a teacher is to shape learning situations as interindividual, identical arrangements of learning opportunities which are coincidental for each student. To emphasize this difference, "situation" in its objective meaning is put in quotation marks.

5 This statement takes into account that learning "situations" represent learning objects by which learners should train their professional skills (Dilger et al., 2006, p. 8).

6 This issue describes the problem of a lack of learning transferability. In this case, the knowledge required for solving a task (here: coping with a learning situation) is available, but the necessary knowledge required for capturing the relevant practical conditions is not (Renkl, 1996, pp. 79–87; Gruber & Renkl, 2000, pp. 163–168).

7 Even if it sounds trivial, here the problem of the lack of transferability is already relevant. The contents which have already been learned cannot be applied if the chance to apply this knowledge is not recognized (or is not intended to be recognized; in this case, the goal that should be achieved from an external point of view is not the goal that is intended to be achieved by the apprentice, and the "coping competence" remains irrelevant).

8 In the notion of the learning field approach this expression is a replacement for the term "learning situation".

REFERENCES

Aebli, H. (1987). *Zwölf Grundformen des Lehrens*. Stuttgart: Klett-Cotta.

Albert, H. (1982). *Die Wissenschaft und die Fehlbarkeit der Vernunft*. Tübingen: Mohr.

Bader, R., & Schäfer, B. (1998). Lernfelder gestalten - Vom komplexen Handlungsfeld zur didaktisch strukturierten Lernsituation. *Die berufsbildende Schule (50)*, 229–234.

Beck, K. (1996). Die ‚Situation' als Bezugspunkt didaktischer Argumentationen - Ein Beitrag zur Begriffspräzisierung. In W. Seyd, & R. Witt (Eds.) *Situation, Handlung, Persönlichkeit: Kategorien wirtschaftspädagogischen Denkens*. Hamburg: Feldhaus, 87–98.

Berger, P. L., & Luckmann, T. (1993). *Die gesellschaftliche Konstruktion der Wirklichkeit*. Frankfurt: Fischer.

Bienengräber, T. (2009). Es gibt nichts Gutes, außer: man tut es - Berufsmoralische Entwicklung im Lichte des didaktischen Situationismus. *Pädagogische Rundschau, 63*(3), 319–329.

Bienengräber, T. (2012). *Eine Theorie der Situation - mit Beispielen für ihre Anwendung im Bereich der kaufmännischen Berufsbildung*. Frankfurt: Peter Lang.

Brezinka, W. (1995). *Gesammelte Schriften Bd. 5: Erziehungsziele, Erziehungsmittel, Erziehungserfolg. Beiträge zu einem System der Erziehungswissenschaft*. München: Reinhardt.

Buschfeld, D. (2003). Draußen vom Lernfeld komm‘ ich her.... ? *bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 4*, 1–21.

Dilger, B., Krakau, U., Rickes, M., Sloane, P. F. E., & Tiemeyer, E. (2006). *Entwicklung von Lernsituationen zur Förderung selbstregulierten Lernens - Modellversuchsinformation 4 aus dem BLK-Projekt segel-bs*. Soest.

Dubs, R. (1999). Die Ausbildung in Kreditinstituten vor dem Hintergrund veränderter Anforderungen. In P. Sieberts, & J. H. von Stein (Eds.) *Handbuch Banken und Personal*. Frankfurt: Knapp, 443–475.

Dubs, R. (2000). Lernfeldorientierung: Löst dieser neue curriculare Ansatz die alten Probleme der Lehrpläne und des Unterrichts an Wirtschaftsschulen? In A. Lipsmeier, & G. Pätzold (Eds.) *Beiheft 15 zur Zeitschrift für Berufs- und Wirtschaftspädagogik*. Stuttgart: Steiner, 15–32.

Esser, H. (1996). Die Definition der Situation. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *48*(1), 1–34.

Gerstenmaier, J., & Mandl, H. (1995). Wissenserwerb unter konstruktivistischer Perspektive. *Zeitschrift für Pädagogik*, *41*(6), 867–888.

Gruber, H., & Renkl, A. (2000). Die Kluft zwischen Wissen und Handeln: Das Problem des trägen Wissens. In G. H. Neuweg (Ed.) *Wissen Können Reflexion*. Innsbruck: Studien-Verlag, 155–174.

Grüner, G. (1967). Die didaktische Reduktion als Kernstück der Didaktik. *Die deutsche Schule, 59*, 414–430.

Heckhausen, H. (1989). *Motivation und Handeln* (2 ed.). Berlin: Springer.

Heid, H. (2001). Situation als Konstrukt. Zur Kritik objektivistischer Situationsdefinitionen. *Schweizerische Zeitschrift für Bildungswissenschaften, 1*(23), 513–528.

Joas, H. (1980). Rollen- und Interaktionstheorien in der Sozialisationsforschung. In K. Hurrelmann, & D. Ulich (Eds.), *Handbuch der Sozialisationsforschung* (5 ed.). Weinheim: Beltz, 137–152.

Kell, A., & Kutscha, G. (1977). Kritische Theorie der ökonomischen Bildung und das Problem der didaktischen Reduktion. *Zeitschrift für Pädagogik, 23*(3), 345–368.

Kornmilch-Bienengräber, T. (2006). Zur Entwicklung situationsorientierter Bildungsstandards in der kaufmännischen Berufsbildung. In G. Minnameier, & E. Wuttke (Eds.) *Berufs- und Wirtschaftspädagogische Grundlagenforschung*. Frankfurt: Peter Lang, 321–334.

Kornmilch-Bienengräber, T. (2007). Berufsmoralische Entwicklung im Lichte des didaktischen Situationismus. In D. Münk, J. van Buer, K. Breuer, & T. Deißinger (Eds.) *Hundert Jahre kaufmännische Ausbildung in Berlin*. Farmington Hills: Budrich, 94–107.

Kremer, H.-H., & Sloane, P. F. E. (1999). Lernfelder - Motor didaktischer Innovationen? *Kölner Zeitschrift für Wirtschaft und Pädagogik, 14*(26), 1–25.

Kultusministerkonferenz. (2002). *Rahmenlehrplan für den Ausbildungsberuf Versicherungskaufmann/ Versicherungskauffrau*.

Laucken, U. (1995). Situation. In J. Ritter, & K. Gründer (Eds.) *Historisches Wörterbuch der Philosophie* (Vol. 9). Darmstadt: Wissenschaftliche Buchgesellschaft, 929–937.

Lehrl, S. (1974). Subjektives Zeitquant und Intelligenz. *Grundlagenstudien aus Kybernetik und Geisteswissenschaft/Humankybernetik, 15*(3), 91–96.

Lehrl, S., Jeske, H., Ehmke, U., Jarmark, E., Frank, H. G., & Fischer, B. (1982). Subjektives Zeitquant als generelle individuelle Grundgröße. *Grundlagenstudien aus Kybernetik und Geisteswissenschaft/ Humankybernetik, 23*(3), 125–130.

Meyer, H. L. (1975a). Skizze des Legitimationsproblems von Lernzielen und Lerninhalten. In K. Frey (Ed.), *Curriculum-Handbuch*, Band 2. München: Piper, 426–438.

Meyer, H. L. (1975b). *Trainingsprogramm zur Lernzielanalyse* (2 ed.). Frankfurt/M.: Athenäum Fischer Taschenbuch.

Miller, G. A., Galanter, E., & Pribram, K. (1991). *Strategien des Handelns: Pläne und Strukturen des Verhaltens*. Stuttgart: Klett-Cotta.

Neisser, U. (1996). *Kognition und Wirklichkeit: Prinzipien und Implikationen der kognitiven Psychologie*. Stuttgart: Klett-Cotta.

Neumann, O. (1992). Theorien der Aufmerksamkeit. *Psychologische Rundschau,43*, 83–101.

Neumann, O. (1996). Theorien der Aufmerksamkeit. In O. Neumann, & A. F. Sanders (Eds.) *Aufmerksamkeit*. Göttingen: Hogrefe, 559–643.

Parsons, T. (1967). Einige Grundzüge der allgemeinen Theorie des Handelns. In H. Hartmann (Ed.) *Moderne amerikanische Soziologie: neuere Beiträge zur soziologischen Theorie*. Stuttgart: Enke, 153–171.

Pöppel, E. (1997). *Grenzen des Bewußtseins* (Neuausg.). Leipzig: Insel.

Posch, P., Schneider, W., & Mann, W. (1989). *Unterrichtsplanung: Mit Beispielen für den betriebswirtschaftlichen Unterricht*. Wien: Manz.

Reetz, L. (2006). Zur Rolle des Persönlichkeitsprinzips im Rahmen curricularer Gestaltungsprinzipien kaufmännischer Berufsausbildung. In G. Minnameier, & E. Wuttke (Eds.) *Berufs- und Wirtschaftspädagogische Grundlagenforschung.* Frankfurt: Peter Lang, 57–75.

Renkl, A. (1996). Träges Wissen: Wenn Erlerntes nicht genutzt wird. *Psychologische Rundschau, 47*(2), 78–92.

Robinsohn, S. B. (1972). *Bildungsreform als Revision des Curriculum und Ein Strukturkonzept für Curriculumentwicklung* (4. ed.). Neuwied: Luchterhand.

Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik, D. (1996). *Handreichung für die Erarbeitung von Rahmenlehrplänen der Kultusministerkonferenz für den berufsbezogenen Unterricht in der Berufsschule und ihre Abstimmung mit Ausbildungsordnungen des Bundes für anerkannte Ausbildungsberufe*. Neuwied: Luchterhand.

Sloane, P. F. E. (2000). Lernfelder und Unterrichtsgestaltung. *Die berufsbildende Schule, 52*(3), 79–85.

Sloane, P. F. E. (2003). Schulnahe Curriculumentwicklung. *bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 4)*, 1–23.

Tramm, T. (2003). Prozess, System und Systematik als Schlüsselkategorie lernfeldorientierter Curriculumentwicklung. *Berufs- und Wirtschaftspädagogik online (3)*.

van der Heijden, A. (1996). Visuelle Aufmerksamkeit. In O. Neumann, & A. F. Sanders (Eds.) *Aufmerksamkeit*. Göttingen: Hogrefe, 7–60.

von Stein, J. H., & Gruber, D. (1999). Rahmenbedingungen der Bankenlandschaft. In P. Sieberts, & J. H. von Stein (Eds.), *Handbuch Banken und Personal*. Frankfurt: Knapp, 3–18.

Weinert, F. E. (2002). Vergleichende Leistungsmessung in Schulen - eine umstrittene Selbstverständlichkeit. In Ders. (Ed.) *Leistungsmessungen in Schulen* (2 ed.). Weinheim: Beltz, 17–31.

Wundt, W. (1913). *Einführung in die Psychologie* (3. Abdruck). Leipzig: Voigtländer.

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BASIC COMPETENCIES AS DETERMINANTS OF SUCCESS IN COMMERCIAL APPRENTICESHIPS

INTRODUCTION

The aim of this paper is to shed light on the structural relationships between basic academic competencies as acquired in German secondary schools and the achievement levels attained in the specific learning contexts of apprenticeships in the commercial sector. It is of considerable practical importance to assess the degree to which the outcomes of general academic programs contribute to the successful completion of "dual training programs" as delivered conjointly by commercial enterprises and vocational schools. Obviously, such investigation cannot be conducted successfully without reference to a larger array of potential determinants of education and training outcomes and – in particular – longitudinal evidence.

THEORETICAL FRAMEWORK

Analyses of relationships between individual antecedents, background characteristics, learning environment, and context factors, on the one hand, and learning achievement on the other, are often based on diverse theoretical assumptions and research traditions which in turn are rooted in different academic disciplines such as curriculum theory, content pedagogy, theories of learning and instruction, motivational psychology and school effectiveness research (cf. Helmke, 2003, pp. 28ff.). A number of comprehensive models have been developed to take the complex relationships between the determinants of successful learning into account. Most of these are essentially based on analogies assumed to exist with economic productivity functions as well as concepts of interrelated learning environments (e.g., Ditton, 2007; Reynolds & Teddlie, 2000). They usually comprise a number of explanatory "blocks" which are taken to influence simultaneously the learning processes under investigation. The respective relationships are not confined to linear-additive effects. Rather, hierarchical data structures and interaction effects within and between the different levels of aggregation are often taken into consideration. Also, multiple criteria of educational achievement are to be considered. It is, indeed, generally assumed that cognitive achievement in itself is insufficient for young people to prepare for highly qualified work, where "can do" is the key to translating the term "competency" into practice. Cognitive and meta-cognitive abilities as well as non-cognitive traits such as achievement motivation, beliefs in self-efficacy, self-regulation, and

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the ability to work and communicate effectively in collaborative settings, are constituent concepts frequently embedded in these models. Although there is still quite a gap between the current state of analysis and these postulates (cf. Ditton, 2007), some conceptual and structural elements have been well established in a series of meta-analyses (cf. Creemers & Kyriakides, 2008; Scheerens, 2007; Scheerens & Bosker, 1997). Therefore, the majority of large-scale assessments in Central Europe since the late 1990s have accepted this "supply-vs.-utilization paradigm of education" (Fend, 1998). According to this framework, instruction comprises a supply of learning opportunities which are effective if and only if they are taken advantage of by the learners. The latter condition is contingent upon mediating individual, institutional and contextual factors. But while there is a considerable body of studies pertaining to the respective effects in academic school programs, there is clearly a need for differentiated research related to the acquisition of many facets in the wide array of vocational competencies. For noteworthy exceptions, see Breuer and Höhn (1997) and Breuer (2002).

Existing studies which do relate to industrial and technical as well as to commercial occupations have demonstrated that basic academic competencies such as mathematical abilities and reading comprehension along with certain meta-cognitive strategies contribute substantially to the successful completion of a vocational education or training program (see, e.g., Nickolaus et al., 2010; Nickolaus & Norwig, 2009; Rosendahl & Straka, 2011). There is, however, considerable variation with regard to observed effect sizes between the existing studies and the occupations investigated. Even within a given occupation, findings as to the impact of basic academic competencies and general cognitive abilities are far from being consistent. Thus Straka, in his study of trainee bank clerks, has identified general intelligence as the primary determinant of test scores in economics, which, after being partialed out, causes the influence of mathematics and reading comprehension to fall below the level of statistical significance (Nickolaus et al., 2010). Other studies have found mathematical abilities to be particularly important predictors as compared with general intelligence. Winther (2010) has suggested that general mathematics and language competencies may have different effects, depending on specific occupational demands under investigation. Whereas language abilities could be shown to relate to the acquisition of competencies in the domain of general business administration, this did not seem to apply to accounting skills which are taught in very specific courses (cf. Lehmann & Seeber, 2007; see also Achtenhagen & Winther, 2009).

Thus, even within the domain of business education, it is far from clear which kinds of prior abilities are conducive to the acquisition of particular competencies expected of trainees just prior to their transition into an appropriate employment. The current instability of findings with regard to the role of cognitive antecedents in vocational education clearly merits investigation, for it is, indeed, difficult to see how practical improvements can be achieved without a better understanding of the individual's initial – necessarily general – competencies. This holds true despite indications that initial domain-specific knowledge also plays a key role in the prediction

of successful completion of a training program (see Rosendahl & Straka, 2011), for such findings beg the question as to the origins of the respective prior knowledge. In any event, the analyses presented here are intended as a contribution towards a better understanding of the ways of leading apprentices to a successful completion of their business education.

DATA SOURCES AND METHODS

In 1995, the Education Authority of the City of Hamburg, Germany, initiated a census of educational achievement among all students of public Grade 5 classrooms (with only special-needs students excluded). The first data collection took place at the beginning of the school year 1996/97. By 1998, it had been decided to test the same students again, now at the beginning of Grade 7, and from then on, data were collected every two years, ending in 2005 just prior to university entry or – in many cases – completion of some kind of vocational education or training for this cohort. Thus, the study to which the present results pertain is part of a comprehensive, nine-year longitudinal census, known under the acronym LAU (see Behörde für Schule und Berufsbildung, 2012; initial $N \approx 13{,}000$). Whereas the pre-university students are of no concern here, it is noteworthy that by 2002 a large portion of the initial cohort had entered some form of vocational education or training. Although there was some fluctuation with respect to the original population investigated (family-based student mobility, grade repetition, mobility between school programs, influx of students from neighboring States in order to get access to special training programs etc.), the attained target group of approximately 9000 beginners in "dual" training programs and full-time vocational schools constituted a census in its own right (ULME I: Lehmann et al., 2005). Moreover, 17 of the quantitatively most important training programs were selected to obtain quantitative measures of their vocational competencies as close as possible to the end of their training program (ULME III: Lehmann & Seeber, 2007). Seven of these related to programs for future bank clerks.

The instrumentation of the study was constituted by an array of cognitive and non-cognitive measures, including standardized tests. These were calibrated using probabilistic scaling techniques which have facilitated equating both horizontally across school types and training programs and vertically across measurement points, i.e. years within the respective vocational training program. The findings to be reported here are, however, confined to two rather specific groups:

- Trainees in office management assistance (*Bürokaufleute*, N = 156);
- Trainees in management assistance for retail services (*Einzelhandelskaufleute*, N = 319).

The blueprints for measuring the respective occupational competencies were constructed to represent complex work and business processes in such a way that content domains as well as cognitive levels within them could be distinguished. The data thus

obtained were subjected to analyses according to the Item Response Theory (Fischer & Molenaar, 1995) in order to produce one- and multi-dimensional scales as the required empirical basis for inferences with respect to the emergence and eventual structure of vocational competence. This included, as indicated above, the investigation of the relationships between economic competencies and accounting skills, on the one hand, and their academic antecedents on the other. The computer program ACER ConQuest Version 2.0 (Wu, Adams, Wilson & Haldane, 2007) was used for these purposes.

Whereas the demographic variables used here cover only some very basic aspects and while the cognitive variables which were employed as predictors of success at the end of the apprenticeship are very much akin to proven measures in this field, the tests of economic competence used here merit a few remarks. A relatively large portion of the *test for office management assistance*, namely 56 items, referred to what may be labeled as economic reasoning, as opposed to 39 items which were rather narrowly focused on accounting skills. Despite a slightly better model fit under the assumption of a two-dimensional test structure, the latent correlation between the two factors of $\varphi = 0.78$ appeared to justify also an interpretation of the test results under the assumption of a latent unidimensionality and to design the scaling routine respectively. In the case of the *test for management assistance for retail services*, nine items which pertained primarily to accounting proved too difficult for this group; thus they offered practically no discrimination and had to be excluded from further analyses. So here, too, the assumption of a one-dimensional test structure was the only justifiable option. To work on the basis of a one-dimensional test structure in both instances had the additional advantage of a higher degree of comparability between the two analyses.

Table 1 in the Appendix (p. 81) lists the basic statistics for the variables included in the present inquiry. In order to assess the interrelationships between the key concepts of this investigation, two separate structural equation models have been estimated using MPlus 5.0, one for the trainees in office management assistance (Figure 1) and one for apprentices in management assistance for retail services (Figure 2).

RESULTS

The application of IRT scaling techniques revealed that student performance in both domains investigated was somewhat below the expectations as embedded in the test. Performance on the items whose curricular validity had been ascertained beforehand by experts from the Authority was generally lower than prescribed in the relevant official documents. In the group training for office management assistance, mean student performance in economic reasoning was 33.6 percent of a standard deviation below the overall mean item difficulty, and performance in accounting problems even 1.48 standard deviations. Despite being generally more successful in terms of economic reasoning, the students appear to have had particular difficulties in solving those items which asked them to conceive complex economic decisions as opposed to performing routine mathematical operations. Also, they

had problems with the interpretation of abstract graphs and the respective functions (cf. Seeber, 2008).

New insights could be generated from the mathematical test arrangement. Immediately after entry into the vocational program, an entry test was administered which comprised two separate tests – one more driven by curriculum content ("Mathematics I") and the other more geared towards situated applications ("Mathematics II"). Both measures served as indicators of the competencies conveyed by schools and could be interpreted as manifestations of a single underlying latent construct. By way of contrast, a further test covering "Document literacy" in the sense of the International Adult Education Survey (IALS) (cf. OECD & Statistics Canada, 2000) which was given towards the end of the apprenticeship measured the ability to identify, integrate, cycle and generate numerical information on the basis of various modes of presentation.

In the case of office management assistance, both "Mathematics" (measured at the beginning of the program) and "Documents" (measured at its end) could be shown to have substantial – independent – power in predicting success in vocational training (see Figure 1). The impact of "Mathematics" is enhanced considerably by its indirect contribution through "Documents", resulting in a total effect of more than 0.40. As was to be expected, performance in the initial "Mathematics" test was rather closely related to nonverbal intelligence as a prerequisite or at least covariate. Similarly, initial reading comprehension affected the economic competency among graduates from the office management assistance course only indirectly through

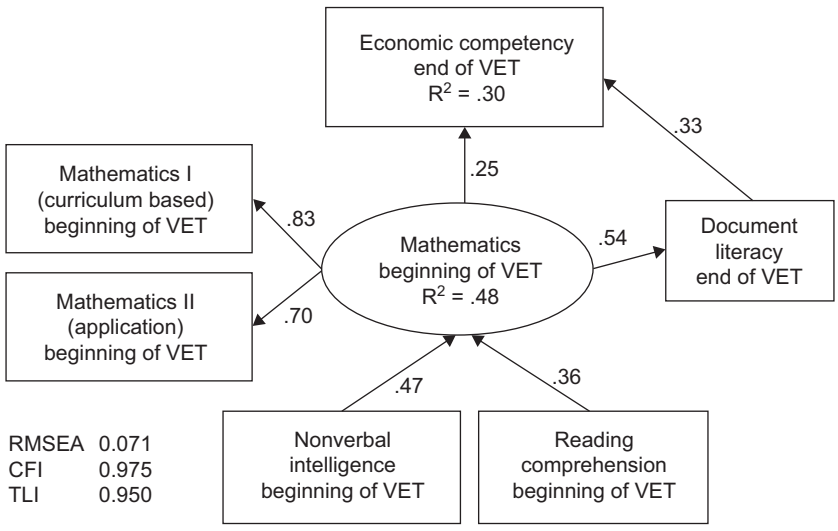

Figure 1. Structural equation mode: office management assistance trainees in the City of Hamburg (N = 136).

mathematics. Thus, mathematical competencies as taught and learnt in schools do play – in a variety of ways – a key role for the successful completion of an office management assistance program. Incidentally, they are by far more important than the net effects of socio-demographic characteristics that are blamed so often for the failure of students from precarious social settings. This is, of course, not to say that social factors (class, ethnicity, gender etc.) are unimportant. The implication is, however, that these influences operate primarily at earlier stages in young people's trajectories through the highly differentiated German educational system.

The situation among trainees for management assistance in retail services was somewhat different (see Figure 2). In this domain, it was possible to distinguish between reading comprehension proper and the concomitant meta-cognitive abilities involved. Both could be shown to be indicative of a single underlying dimension, as was the case with the two mathematics scales. Not surprisingly, this complex measure of reading appeared to be positively influenced by the possession of German as a mother tongue. One might have expected the same to be true for the availability of books in the parental home, but here, the influence of such "cultural capital" on mathematical abilities was even more pronounced. As opposed to the group of trainees for office management assistance, nonverbal intelligence appeared to have an influence on both reading and mathematics. But in the field of assistance for retail services, too, mathematics clearly had a predominant role over reading.

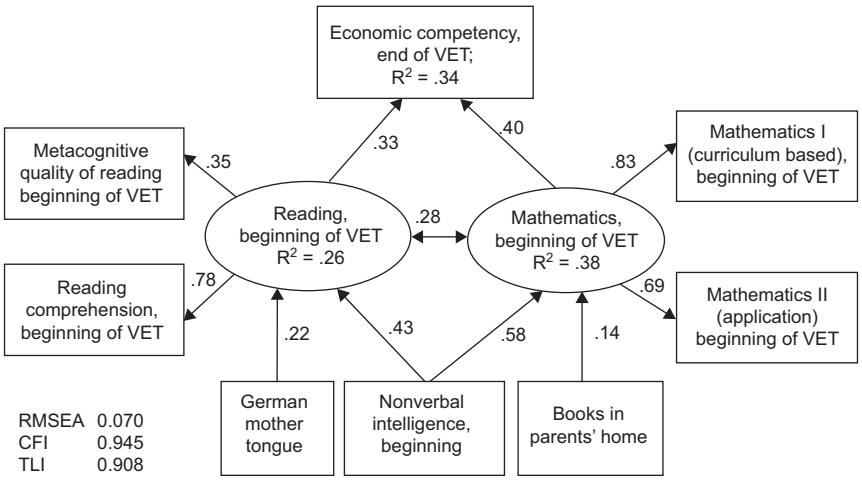

Figure 2. Structural equation mode: management assistance trainees for retail services in the City of Hamburg (N = 231).

DISCUSSION

The results of the respective analyses confirm assumptions according to which mathematics and – to a somewhat lesser degree – reading comprehension contribute as general, school-acquired key competencies to the development of the much more specific abilities which are at the center of vocational education and training. While this is, indeed, postulated by the organizations implementing PIRLS, TIMSS, PISA, and a host of national and regional surveys, the exact patterns of relationships still need to be established for most vocational domains and subsequent employment careers. While the present analyses fall short of generalizations referring to working life, they provide at least exemplary extensions beyond the area of general schooling.

It is remarkable in this context that recruitment patterns of particular vocational education and training programs (at least in Germany, but very likely in other countries as well) seem to result in quite disparate levels of trainability with respect to the more challenging demands in the process of acquiring vocational competencies. Table 1 reveals quite substantial differences in the cognitive levels at the beginning of the course; cf. the mean differences between the two groups studied in terms of metacognitive abilities, application-oriented mathematics and document literacy. Implications for differential approaches to teaching the respective vocational courses are obvious, but it would be highly interesting to relate these differences also to diverging age-to-earning profiles during working life as well as to the social positions attained by the graduates from different vocational education and training programs such as – in the present case – office management assistance and management assistance for retail services.

Table 1. Sampling and test design for two groups of vocational trainees in the City of Hamburg

	office management assistance trainees		*management assistance trainees for retail services*	
	mean	*standard deviation*	*mean*	*standard deviation*
Non-verbal intelligence	33.78	5.33	32.23	5.63
Reading comprehension	134.01	16.13	132.40	16.42
Meta-cognitive quality of reading	80.27	11.89	74.38	12.77
Mathematics (curricular based)	123.62	17.11	119.09	16.76
Mathematics (application)	102.55	19.20	94.72	19.53
English C-Tests	135.29	17.45	126.32	17.48
English reading comprehension	85.34	25.81	75.74	24.28
N (end of VET)	156		319	

REFERENCES

Achtenhagen, F., & Winther, E. (2009). *Konstruktvalidität von Simulationsaufgaben: Computergestützte Messung berufsfachlicher Kompetenz – am Beispiel der Ausbildung von Industriekaufleuten.* Abschlussbericht für das Bundesministerium für Bildung und Forschung. [Construct validity of simulation tasks: computer-based measurement of vocational competence - the example of educating industrial clerks. Final report for the Federal Ministry of Education and Research]. Berlin, Bonn. Retrieved 15.08.2010 from http://www.bmbf.de/pub/Endbericht_ BMBF09.pdf.

Behörde für Schule und Berufsbildung (Ed.) (2012). *LAU: Aspekte der Lernausgangslage und der Lernentwicklung von Schülerinnen und Schülern an Hamburger Schulen.* [Aspects of the Initial Achievement Levels and Learning among Secondary Students in Hamburg]. 2 vol. Münster: Waxmann.

Breuer, K. (2002). Evaluation of Authentic Assessment in Vocational Examinations: Approaches within the German Dual System. In Breuer, K., & Beck, K. (Eds.) *Are European Vocational Systems up to the Job?* Frankfurt: Peter Lang, 153–166.

Breuer, K., & Höhn, K. (1997). Die Abschlussprüfung für den neu geordneten Ausbildungsberuf „Versicherungskaufmann/ -kauffrau". [Final examination for VET of insurance manager] *Wirtschaft und Erziehung 12*/97, 404–411.

Creemers, B.P.M., & Kyriakides, L. (2008). *The dynamics of educational effectiveness: a contribution to policy, practice and theory in contemporary schools.* London: Routledge.

Ditton, H. (2007). Schulqualität – Modelle zwischen Konstruktion, empirischen Befunden und Implementierung. [School quality - construction, evidence, and implementation of different models. In J. van Buer, & C. Wagner (Eds.) *Qualität von Schule. Ein kritisches Handbuch.* Frankfurt: Peter Lang, 83–92.

Fend, H. (1998). *Qualität im Bildungswesen: Schulforschung zu Systembedingungen, Schulprofilen und Lehrerleistung*. Weinheim: Juventa.

Fischer, G. H., & Molenaar, I. W. (1995). *Rasch models – Foundations, recent developments, and applications.* New York: Springer.

Helmke, A. (2003). *Unterrichtsqualität erfassen, bewerten, verbessern.* [To Describe, Evaluate, and Improve the Quality of Instruction]. Seelze: Kallmeyersche.

Lehmann, R, Ivanov, S., Hunger. S., & Gänsfuß, R. (2005). ULME I - Untersuchung der Leistungen, Motivation und Einstellungen zu Beginn der beruflichen Ausbildung. *Hamburg: Hamburger Institut für berufliche Bildung*. Retrieved 25.05.2012 from www.gaebler.info/hamburg/ulme-1.pdf.

Lehmann, R., & Seeber, S. (Eds.) (2007). *Untersuchung von Leistungen, Motivation und Einstellungen der Schülerinnen und Schüler in den Abschlussklassen der Berufsschulen*. [Study of student achievement, motivation and attitudes in the final grade classrooms of vocational schools]. Hamburg: Hamburger Institut für berufliche Bildung. Retrieved 13.03.2012 from http://www.hibb.hamburg.de/index.php/file/download/906?PHPSESSID=037e73ae8fca0c38ad8ef0664742ad04.

Nickolaus, R., & Norwig, K. (2009). Mathematische Kompetenzen von Auszubildenden und ihre Relevanz für die Entwicklung von Fachkompetenz – ein Überblick zum Forschungsstand. [Mathematical competencies of trainees: their relevance for the development of occupational competence - an overview over the state of research]. In A. Heinze, & M. Grüßing (Eds.) *Mathematiklernen vom Kindergarten bis zum Studium.* Münster: Waxmann, 205–216.

Nickolaus, R., Straka, G. A., Fehring, G., Gschwendtner, T., Geißel, B., & Rosendahl, J. (2010). Erklärungsmodelle zur Kompetenz- und Motivationsentwicklung bei Bankkaufleuten, Kfz-Mechatronikern und Elektronikern. [Explanatory models for the development of occupational competence among trainees for banking, automobile mechatronics, and electronics.] *Zeitschrift für Berufs- und Wirtschaftspädagogik, Beiheft 23*, Stuttgart, 73–87.

OECD & Statistics Canada (2000). *Literacy in the Information Age. Final Report of the International Adult Literacy Survey. Organization for Economic* Co-operation and Development, Paris, and the Minister of Industry, Canada.

Reynolds, D., & Teddlie, C. (2000). An Introduction to School Effectiveness Research. In Teddlie, C., & Reynolds, D. (Eds.) *The International Handbook of School Effectiveness Research*. London: Falmer, 3–25.

Rosendahl, J., & Straka, G. (2011). *Effekte personaler, schulischer und betrieblicher Bedingungen auf berufliche Kompetenzen von Bankkaufleuten während der dualen Ausbildung*. [Effects of personal traits and abilities and of learning environments in schools and training companies on competence development of bank clerks during VET]. ITB Forschungsberichte Nr. 51/2011. Universität Bremen. Retrieved from http://nbn-resolving.de/urn:nbn:de:gbv:46-00102039-12.

Scheerens, J. (2007). The case of evaluation and accountability provisions in education as an area for the development of policy malleable system level indicators. *Zeitschrift für Erziehungswissenschaft, 9*, *Beiheft 6*/2006, 207–224.

Scheerens, J., & Bosker, R. J. (1997). *The Foundations of Educational Effectiveness*. Oxford.

Seeber, S. (2008). Ansätze zur Modellierung beruflicher Fachkompetenz in kaufmännischen Ausbildungsberufen. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 104*, 74–97.

Winther, E. (2010). *Kompetenzmessung in der beruflichen Bildung*. [The Measurement of Competencies in Vocational Education]. Bielefeld: Bertelsmann.

Wu, M. L., Adams, R. J., Wilson, M. R., & Haldane, S.A. (2007). *ACER ConQuest Version 2: Generalised item response modelling software*. Camberwell: Australian Council for Educational Research.

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FRITZ KLAUSER & JULIANA SCHLICHT

ASSESSING THE VALUE OF KNOWLEDGE, SKILLS, ATTITUDES, MOTIVATION AND EMOTION FROM A PEDAGOGICAL AND AN ECONOMIC PERSPECTIVE

Klaus Breuer's research activities are closely related to assessment and measurement issues. Since his early work, "Assessing Training for Problem-oriented Information Retrieval", in 1984 he has constantly investigated the questions of how technology/computer-based learning and teaching processes should be analyzed and what kind of effects are induced by such instructional designs. This article explores assessment and measurement issues concerning so-called "intangible" phenomena of teaching and learning processes like knowledge, skills, attitudes, motivation and emotion. The article investigates this matter with regard to adult education in technology/computer-based and traditional classroom settings. It aims at focusing on the following questions:

- What is the economic value of intangible phenomena like knowledge, skills, attitudes, motivation and emotion?
- How can the economic value of intangible phenomena be analyzed empirically?
- A person's knowledge, motivation, attitudes and emotions are supposed to be changed by adult education. What are adequate approaches and methods to assess these changes empirically and to analyse whether the qualification is worth the training costs?
- How can the efficiency of teaching and learning processes be expressed in monetary terms?
- What kind of results could be achieved by using traditional economic approaches to assess the value of knowledge, motivation, attitudes and emotion, e.g. cost-benefit analysis, activity-based costing, willingness-to-pay, human capital? What are their advantages and constraints?

How should traditional economic concepts and approaches be modified for evaluating adult education in order to meet both the pedagogical perspective on learning and the economic perspective on monetary valuation?

RELEVANCE OF THE TOPIC AND RESEARCH ISSUES

Many companies and public institutions as well as schools and universities are increasingly expected to prove the monetary value and efficiency of adult education.

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 85–98.

In times of economic crises they are forced to define and count the costs and benefits that are related to teaching and learning processes. Therefore the economics of education have developed a small variety of tools and methods, such as cost-effectiveness analysis (CEA), cost-utility analysis (CUA) and cost-benefit analysis (CBA) (see Dolton, 2004; Levin & McEwan, 2003; Weiß & Preuschoff, 2004). These tools might help to define the monetary value and efficiency of adult education. However, there are still various problems regarding the theoretical foundation and the design of such methods – especially with respect to valuing intangible phenomena like knowledge, motivation, attitudes and emotion.

The article takes into account eight problems which are closely linked with the economic approaches mentioned above. They are primarily induced by different perspectives and underlying assumptions of economics and pedagogical sciences (Schlicht, 2012):

1. The identification of research deficiencies. It is necessary to define what makes it difficult to measure the benefits of education (from here on referred to as the identification problem).
2. The procedure model for reflecting and modifying economic models, instruments and methods (from here on referred to as the methodological problem).
3. The definition of the benefit concept in contrast to the cost concept (from here on referred to as the concept problem).
4. The method which enables meeting the functional requirements of a cost-benefit analysis of adult education (from here on referred to as the function problem).
5. The definition and operationalisation of targets and criteria which form the normative framework of the analysis (from here on referred to as the criterion problem).

In addition, there are three empirical problems regarding the data collection of three effectiveness criteria:

6. The acceptance of learning opportunities,
7. the quality of the teaching and learning process, and
8. the learning success.

Our research is based on an approach to cost-benefit analysis, which connects pedagogical and psychological concepts with modern methods of economic and management research (activity-based costing, and formulas for valuing human capital). The central idea is to transform intangible effects (knowledge, skills, attitudes, motivation, emotion) into economic values (costs, benefits) – or in other words – to price[1] the priceless.

This approach was developed in a project work with the armed forces of the Federal Republic of Germany (*Bundeswehr*). The project compared a traditional classroom-training with a computer-based and network-supported distance learning program that aimed at generating pedagogical and economic arguments for the design of teaching processes. The empirical results are not just determined by the possibilities and limitations of the economic centred method. They depend to a large extent on the definition and measurement of intangible effects.

OPERATIONALIZING INTANGIBLE EFFECTS: FUNCTION, CRITERION AND EMPIRICAL PROBLEM

A cost-benefit analysis of adult education (for example, Nübler, 1992) differs from a purely economic cost-benefit analysis of objects which are determined mostly by observable criteria, physical and chemical processes, like the construction of buildings, streets, power stations or wind farms (see Sen, 2000). It has to fulfill an economic analysis as well as a pedagogical evaluation function[2] (Levin & McEwan, 2003). That means:

- Firstly, the pedagogical effectiveness of a training program has to be measured along with its economic efficiency.
- Secondly, decisions on the further development of adult education should be prepared and supported by empirical results.

Despite this "double function" of a cost-benefit analysis being expected in the literature on the economics of education, previous studies have underlined that it has hardly been realized (Clune, 2002; Ross, Barkaoui & Scott, 2007). One main reason can be seen in the relationship between monetary variables (e.g. costs) and intangible phenomena (e.g. knowledge, motivation, attitudes, emotions), which has not yet been examined – methodologically or empirically. In addition, there is no generally accepted procedure model which depicts how economic concepts and approaches should be reflected and (re-)constructed in such a way that they connect the pedagogical understanding of and the economic perspective on adult education. That is why we have developed an approach which meets the above delineated double function of a cost-benefit analysis. It includes a formula for valuing intangible phenomena in monetary terms (see Figure 1).

$$U_{A_{DL}} = M_{A_{DL}} \times \beta \times N_C \times \left(SD_y \times n_{ExG} \times [(1+t_{AdP}d_{AdP})+(1+t_{AaP}d_{DAP}+t_O\, d_{LAS}) \times (1+t_O d_{Mot}+t_O d_{AIT}) - 2] + \Delta \sum_{pA=1}^{i} AC_{pA} + \Delta \sum_{sA=1}^{i} AC_{sA} \right)$$

1. 2. 3.

Figure 1. Formula for valuing intangible phenomena and outcomes.

The formula represents the methodological basis of the cost-benefit analysis which was realised in the Bundeswehr Project (see Schlicht, 2012). It transforms intangible phenomena and outcomes into a monetary value. The formula connects three criteria of pedagogical effectiveness with economic concepts and approaches that describe the same object but a different research perspective:

(1) The first factors refer to an "acceptance" criterion. In pedagogical sciences the acceptance of learning opportunities is measured when expressing perceived benefits with respect to individually self-determined targets (Bürg, 2005; Klauser, 2006). For that in economic sciences willingness-to-pay is analyzed (Mühlenkamp,

1994; Sen, 2000). Both concepts are similarly structured. Therefore, they could be methodologically connected.

(2) The second term in parentheses deals with a "learning success" criterion. In educational contexts the adult's learning success is measured to describe intangible phenomena – especially the knowledge, motivation, attitudes, skills and emotions of individuals with respect to job requirements and lifelong learning (Achtenhagen & Baethge, 2007; Expertenkommission "Finanzierung Lebenslangen Lernens", 2004). In economic sciences human capital is calculated as the monetary value of these individuals' dispositions (Becker, 1993). The similitude of these two scientific concepts allows them also be connected methodologically.[3]

(3) The third term of the formula bears on a "process" criterion. In pedagogical sciences the quality of the teaching and learning process is an important criterion concerning the effectiveness of adult education (Klauser & Kim, 2004; Seifried, Sembill, Nickolaus & Schelten, 2005). In economic sciences processes are often described monetarily by the approach to activity-based costing (Mayer, 2002). Both process-related approaches imply structural similarities. They mainly refer to social and material components which are necessary preconditions for intangible outcomes.

Using these three pedagogical criteria in combination with the economic concepts and approaches, intangible phenomena could be valued in monetary terms and the "double function" of a cost-benefit analysis can be met.

In the project with the armed forces a monetary value of the computer-based and network-supported distance learning program was estimated. The calculation was realized by the formula and empirical results of the abovementioned pedagogical criteria. The two-month training program has a benefit of about 760,000 € *per annum*, because the participants accept the opportunity to learn and stay positive in their attitudes to the network-supported distance learning program. This program involves a multimedia-based and tutor-supported learning environment, which is more effective and which causes – compared to traditional classroom-training – a higher increase of knowledge, skills and attitudes with respect to job requirements and lifelong learning. In addition, the new training program needs less financial, material and technical resources (e.g. time, seminar rooms, and travel costs; see Schlicht, 2012).

But how are intangible effects integrated into the formula? Figure 2 illustrates the approach based on some empirical results of an attitude assessment.

Figure 2 shows an extract from the evaluation instruments concerning the acceptance criterion. The graphics depict how the measured results are integrated into the formula. U_{ADL} is the estimated annual benefit of the tested training program. It is determined by several factors. M_{ADL} is an acceptance coefficient which is defined by the evaluation results. On a four-point scale, the participants of both groups have to value the network-supported distance learning program. The mean (M) and standard deviation (SD) for each group are measured. In the Bundeswehr Project the acceptance of the learning opportunity was good, and the group difference d_t rather weak and not significant. For both groups, a common mean $M_{ExG,CG}$ was measured

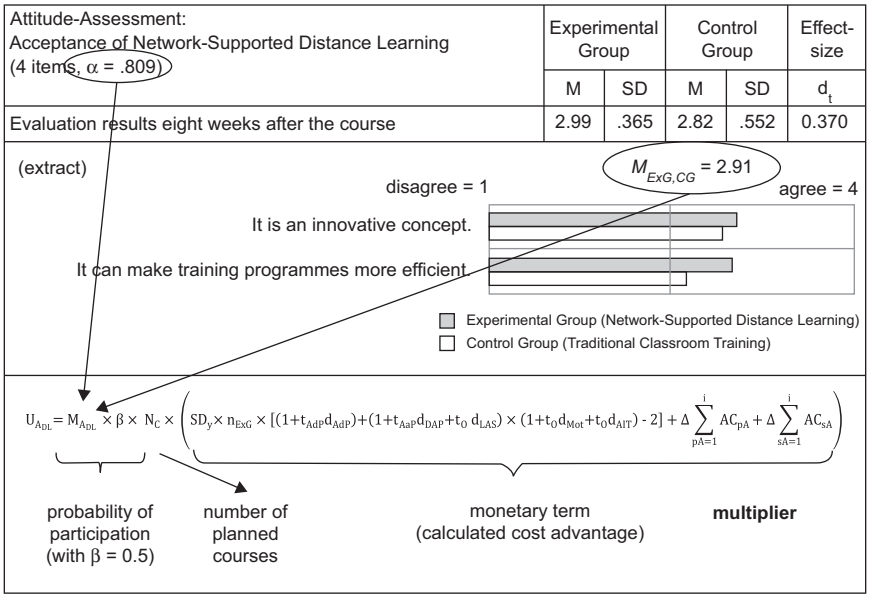

Figure 2. Handling the formula – an empirical example of attitude-assessment.

and corrected by the reliability of the instrument (here Cronbach's Alpha). Together with a regression coefficient b this corrected acceptance coefficient determines the probability of future participation in the program. Both factors (M_{ADL} and b) are multiplied by the number of planned training courses N_C and by a monetary term which stands for a calculated cost advantage resulting from a higher learning success and a higher quality of the teaching and learning process. Altogether, the monetary value U_{ADL} prices the acceptance of the distance learning program. It represents the program's advantage in comparison to the traditional classroom-training.

The approach outlined implies a particular understanding of costs and benefits and several assumptions concerning the valuation of intangible effects by using monetary concepts like willingness-to-pay and human capital. In addition, the formula is constructed by applying a developed procedure model, which allows the modifying of traditional economic concepts and approaches by integrating the pedagogical perspective on adult education.

In the following the procedure model and the theoretical background of the methodological approach are summarized.

PROCEDURE MODEL (METHODOLOGICAL PROBLEM)

Traditional economic concepts and approaches, like willingness-to-pay and human capital, are less effective in order to value intangible phenomena. They have to

be modified, especially in the field of adult education. However, currently there is no generally accepted procedure model for reflecting and modifying economic concepts and approaches. Neither it is widely discussed how pedagogical and economic concepts and approaches could be connected.[4] Recent research results (see Borghans, Duckworth, Heckman & ter Weel, 2008) show that it seems to be necessary to discuss existing methodological approaches even more on a meta-level to overcome their deficiencies.

In the Bundeswehr Project we developed a procedure model concerning these requirements (see Schlicht, 2012). It integrates the economic and pedagogical research perspectives and comprises three steps starting from the pedagogical perspective on adult education:

(1) Pedagogical concepts and approaches are selected according to their suitability for operationalizing and measuring the research objects "adult education" and "intangible effects". In the project we applied concepts and evaluation approaches in order to analyze three effectiveness criteria; acceptance of learning opportunities, learning success, quality of the teaching and learning process.

(2) Those economic concepts and approaches are selected which appear to be suitable for valuing intangible phenomena in monetary terms. While selecting them it should be taken into account whether the underlying principles, assumptions and rules are compatible with the pedagogical concepts and approaches. In our project we investigated concepts and approaches regarding the willingness-to-pay for participating in the computer-based and network-supported distance learning program, the human capital achieved and the activity-based costs of teaching and learning.

(3) The pedagogical and the economic concepts and approaches are connected in such a way that intangible effects (knowledge, motivation etc.) can be evaluated fitting social science standards and be transformed as benefit components. The connecting process implies the modification of the economic research perspective by integrating a pedagogical-psychological understanding of learning and teaching. Figure 2, for example, outlines the modified concept of willingness-to-pay as follows.

The concept of willingness-to-pay is often applied for valuing research objects which do not have a market price (Mühlenkamp, 1994; Sen, 2000). Training programs with the armed forces are such an application. In the specialized economics literature willingness-to-pay stands for a perceived price valuing how consumer needs are satisfied. It implies non-observable attitudes as well as observable behavioural aspects. In economics it is expected that attitudes influence behaviour directly and that the willingness-to-pay could be used for predicting future observable payments.[5]

The learner's attitude towards the qualification offer influences their activity in learning. That is why the acceptance of learning opportunities, especially the participation in newly designed network-supported programs, is examined. In contrast to the traditional economic approach, direct price queries (see Mühlenkamp, 1994, p. 248) are not appropriate from the pedagogical point of view. Psychological studies

show that individuals ascribe a certain value to money (Jonas, Maier & Frey, 2007). That means that an amount of payment mentioned may not be appropriate for valuing the attitude towards a qualification offered. Therefore, the modified concept of willingness-to-pay refers to an indirect pricing approach:

- Firstly, it includes an estimation of future participation in training programs based on attitude tests. Potential participants are not explicitly asked how much they are willing to pay for training participation.
- Secondly, the price is calculated by the measured cost-advantage which is caused by differences in learning success and quality differences in the teaching and learning process.

This indirect pricing approach of willingness-to-pay is predicated on a particular understanding of "costs" and "benefits".

DEFINING COSTS, BENEFITS, EFFICIENCY AND EFFECTIVENESS (CONCEPT PROBLEM)

Traditionally, the costs of adult education are the opposite of its benefits (Levin & McEwan, 2003, p. 136; Weiß & Preuschoff, 2004, p. 22). In purely economic cost-benefit analysis it is assumed that benefits can be counted absolutely, and costs can be subtracted from the benefits to calculate the efficiency of the tested object (Posner, 2000). However, this traditional assumption of costs, benefits and efficiency should not be applied this way in adult educational contexts. Indeed, its modification seems to be one central key for overcoming the deficiencies of traditional economic approaches.

In adult education it does not make sense to define "economic efficiency" without thinking of pedagogical effectiveness (Grin, 2001; Weiß, 2009). The latter indicates the achievement of a training program with respect to defined educational objectives. Figure 3 underlines that pedagogical effectiveness is a precondition for economic efficiency. Thus, a training course can be described as financially right (efficient) only when it is pedagogically effective. Therefore, the efficiency of adult education is not just a technical and goal-neutral construct – like the traditional economic concept of efficiency – but it is a special educational objective-related construct.

Furthermore, it does not make sense to define the benefit of adult education as an opposite to its costs. Costs are only a price concept (Homburg, 2002). In contrast, the word "benefit" defines a relational term describing the pedagogical effectiveness and economic efficiency of adult education with respect to individual, institutional and social objectives (see Bardeleben & Holzschuh, 1996; Kath, 2006; Seeber, 2000; Timmermann, 1998). By modifying the traditional understanding of benefits and costs and establishing an alternative assumption, a meaning of "benefit" is preferred which describes a "cost advantage" comparing at least two alternatives (opportunities). In conclusion, a benefit of adult education refers to both a positive objective-related (non-monetary) effect and a positive costdifference between

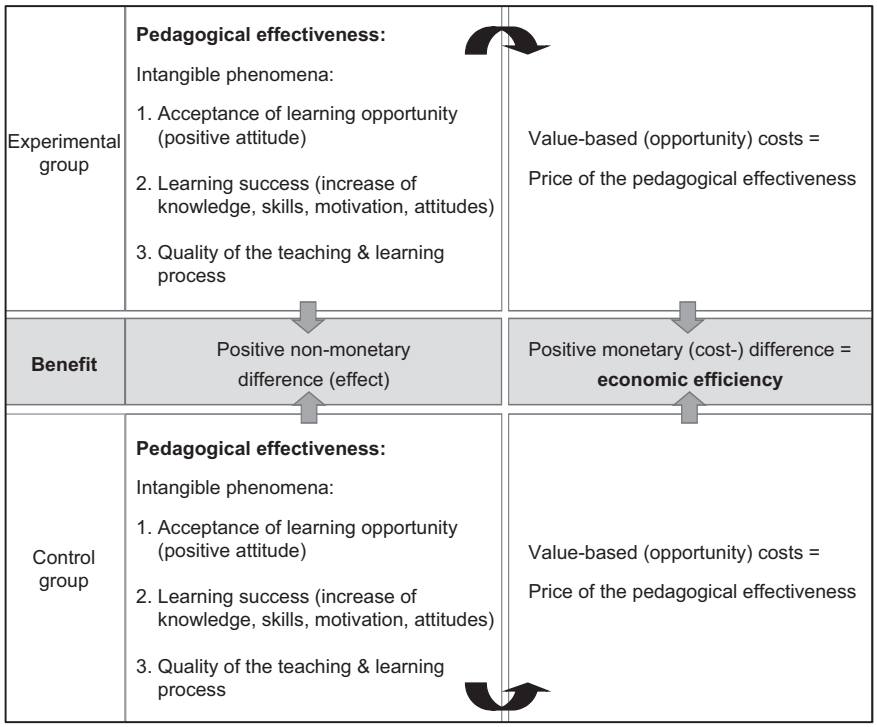

Figure 3. Benefit concept.

alternative educational opportunities (e.g. a computer-based learning program and classroom training).

In order to determine the benefit of adult education, measurement of intangible effects (increase of knowledge, motivation, attitudes etc.) and assessment of group differences have to be realized and supported by an appropriate price concept. As future developments are always considered in the educational context, they have to be assessed even when pricing the benefits monetarily. The concept of "value-based costs" (Homburg, 2002) meets this requirement[6] and is therefore integrated into the model. The calculated monetary difference between two educational alternatives defines the costs which are avoided by implementing a more effective alternative A instead of a less effective opportunity B. This understanding of an educational benefit includes the economic principle of opportunity costs.[7]

The challenge is to measure intended intangible effects in a way that the "double function" of a cost-benefit analysis can be met and three target perspectives are taken into account. In terms of adult education, there are always individual, institutional and social objectives which have to be considered (Achtenhagen et al., 2006; Edelmann & Tippelt, 2007; Expertenkommission "Finanzierung Lebenslangen

Lernens", 2004). Figure 4 summarizes the normative framework of the cost-benefit analysis which was applied to the Bundeswehr Project.

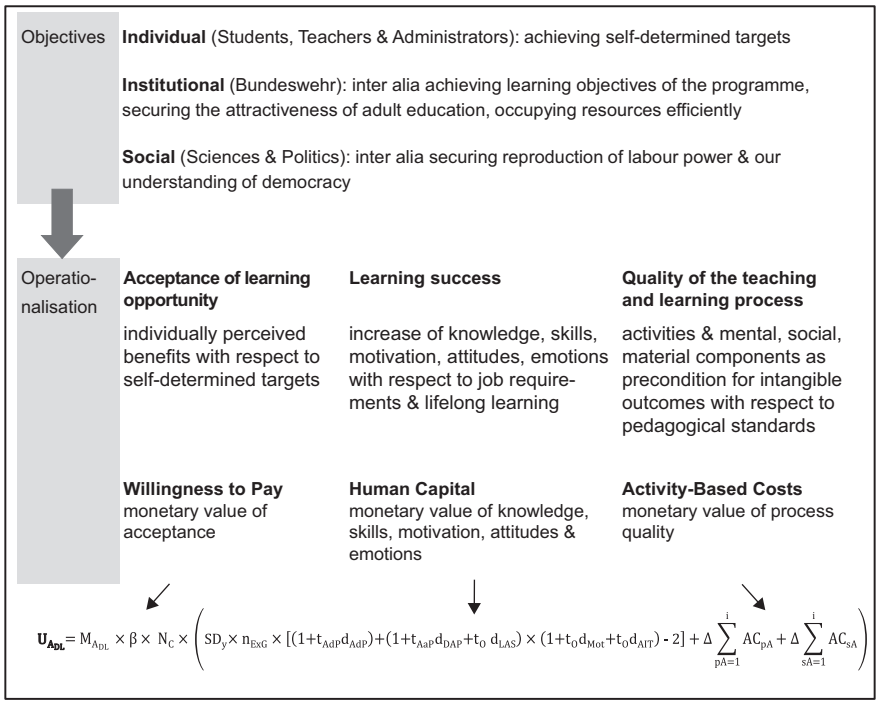

Figure 4. Normative framework of the cost-benefit analysis - objectives and perspectives of adult education.

The individuals involved set targets which they chose themselves and to which they aligned their actions, learning and teaching. The individual objectives may be the same among the people involved. However, they may also be different with respect to institutional and social objectives pursued by adult education. In the Bundeswehr Project the institutional objectives are explained in official documents and orders. As the largest public institution in the adult-education sector, the *Bundeswehr* has to target important educational issues. This includes, in addition to its defence mission, securing the reproduction of labour power and strengthening the understanding of democracy. These objectives and their interactions must be operationalized when a cost-benefit analysis is applied. For that three pedagogical criteria are used in combination with modified economic concepts; acceptance of learning opportunity, learning success, quality of the teaching and learning process (willingness-to-pay, human capital, activity-based costing).

In the literature it is always pointed out that it is "difficult" to measure the benefits of adult education (Dolton, 2004, p. 151; Levin & McEwan, 2003, p. 136; Hummelsheim & Timmermann, 2009, p. 97; Weiß, 2009, p. 378). But what makes the benefit-measurement difficult has not yet been determined precisely. That is why this "identification problem" was explored via a database research. The results are summarized below.

OVERVIEW OF RESEARCH DEFICIENCIES (IDENTIFICATION PROBLEM)

The purpose of the data bank research was to find out what kind of problems we are faced with exactly when applying the traditional approach to cost-benefit analysis in the field of adult education and when investigating a training program empirically. Therefore, 32 empirical studies were examined which were conducted within the last 50 years in that field (see Schlicht, 2012). It was examined whether the studies meet the traditional model requirements. Through the analysis six critical model components were identified, which have not yet been considered in field studies or which have been adopted in a modified form:

Concepts: In most of the studies the terms "cost" and "benefit" are not explicitly defined and differentiated. Overall, the benefit concept is used with different connotations. About two-thirds of the studies reveal some benefits of adult education monetarily like income, revenue figures and/or amounts of willingness-to-pay. Nevertheless, there is neither a consensus whether "benefit" is an absolute or a relative concept nor a solution of how to compare the benefits with the costs of adult education.

Calculation: All studies are based on both the pedagogical calculation of "effectiveness" and the economic calculation of "efficiency". However, the terms are often used with a semantic overlap or they are not defined explicitly. All studies identify costs of adult education, but not all of them count the monetary benefits. Often "effectiveness" is understood as learning outcomes, such as knowledge and attitudes, while "efficiency" is related to monetary input and/or output categories.

Objectives: Most of the empirical cost-benefit studies take into account only two target perspectives of adult education; the individual and the institutional perspective or the individual and the societal perspective. Only a few studies regard all of these three perspectives.

Function: A cost-benefit analysis of adult education focuses on the objectives and conditions as well as the effects of training and learning. But it seems to be difficult to include also procedural aspects of the teaching and learning process. Most of the studies could be called a "black-box" analysis, because they do not meet the pedagogical function of an evaluation. Furthermore, the relationship between monetary amounts (e.g. income) and intangible learning outcomes (e.g. knowledge) remain unproven. One reason for is to be found in the methods and a lack of interdisciplinary work.

Methods: The majority of studies are dominated by quantitative methods for data collection, but only some could be assigned to monetary cost-benefit analysis (CBA), to cost-effectiveness analysis (CEA), or to cost-utility analysis (CUA). A lot of the studies do not consider alternative educational opportunities and could therefore not be assigned to CBA, CEA or CUA.

Interdisciplinary work: The results show that half of the studies were done exclusively by authors whose profession is assigned to the field of economics. The remainder were conducted by authors working in economics as well as in education.

CONCLUSION AND PROSPECTS

In summary, the traditional economic approach to cost-benefit analysis has hardly been applied in the field of adult education. This leads to a lack of economic arguments concerning this kind of education and the implementation of new and innovative training programs. To overcome the research deficiencies a methodological model was developed which allows us to modify the traditional approach by integrating two research perspectives; the pedagogical and the economic point of view. The traditional approach to cost-benefit analysis was reconstructed in such a way that intangible phenomena could be valued monetarily. However, further research is needed. There are still some research questions for which appropriate answers have not yet been found. Above all, it should be investigated whether and how the developed approach can be applied to other research contexts where intangible phenomena are highly influencing variables (e.g. acceptance of renewable energy, environmental education). Further research also has to be done regarding the monetary valuation of the effectiveness criteria (learning success, acceptance of learning opportunity, quality of the teaching and learning process). In particular the following aspects are concerned:

The relationship between individual attitudes and behaviour should be determined more precisely. Currently, pricing the acceptance of learning opportunities is possible by setting an assumption which is generally agreed to in economics, psychology and pedagogical sciences. It says that the behaviour of a person is directly induced by the attitude (Ajzen, 1991). In the formula a regression coefficient $b = 0.5$ is assumed that has commonly been used in empirical studies outside educational contexts. Regression analyses of this kind could not be carried out in our project due to the small sample size ($n_{ExG} = 24$; $n_{CG} = 22$).

Finally, it should be considered under which conditions the understanding of "benefit" worked out can be applied especially to the private economic sector. The approach is based on a benefit concept which only includes a price concept of value-based costs. It should be examined what kind of other pricing concepts, such as revenues and income, can be used to describe the pedagogical effectiveness of adult education monetarily.

In the broadest sense, the approach presented is intended to initiate the discourse between economics, pedagogical sciences and others dealing with intangible phenomena.

NOTES

[1] Schumann (1984) and Lichtblau (2004) underline the epistemological closeness of "value" (German *Wert*), "price" (*Preis*) and "benefit" (*Nutzen*).

[2] See Stufflebeam (2003), Hense and Kriz (2005) whose approaches can be considered as standard models for pedagogical evaluations.

[3] The learning success related term is modeled on economic approaches developed by Schmidt, Hunter and Pearlman (1982), Schmidt (2002), Scholz, Stein and Bechtel (2004), Ortner and Thielmann-Holzmayer (2006).

[4] This idea is not new, but to date it has hardly been realized. For example, Seeber (2000) and Weiß (2008) argue that it is necessary to connect both the pedagogical perspective and the economic point of view when the learning and teaching process, its conditions and its outcomes are assessed in a monetary way.

[5] Mühlenkamp (1994), for example, explains this economic assumption with the psychological "theory of planned behavior" (Ajzen, 1991), which is also often used in pedagogical sciences for modeling the acceptance of learning opportunities (Klauser, 2006).

[6] Value-based costs do not only refer to changes in current financial assets but also consider future development, for example by calculated interests and depreciations (Homburg, 2002).

[7] Opportunity costs represent the value of an opportunity which is foregone because this opportunity is not realized but an alternative chosen.

REFERENCES

Achtenhagen, F., & Baethge, M. (2007). Kompetenzdiagnostik als Large-Scale-Assessment im Bereich der beruflichen Aus- und Weiterbildung. *Zeitschrift für Erziehungswissenschaft, 10*(8. Beiheft), 51–70.

Achtenhagen, F., Beck, K., Bendorf, M., Fuller, A., Minnameier, G., Nijhof, W. J., Wolf, K. D., & Unwin, L. (2006). Berufserziehung als lebenslange Aufgabe. Vocational education as a lifelong learning task. In R. Fatke, & H. Merkens (Eds.) *Bildung über die Lebenszeit*. Wiesbaden: VS Verlag, 111–120.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Bardeleben, R. v., & Holzschuh, J. (1996). *Individuelle Kosten und individueller Nutzen beruflicher Weiterbildung*. Bielefeld: Bertelsmann.

Becker, G. S. (1993). *Human Capital: A Theoretical and Empirical Analysis, with special Reference to Education* (3rd ed.). Chicago: The Univesity Chicago Press.

Borghans, L., Duckworth, A. L., Heckman, J. J., & ter Weel, B. (2008). The Economics and Psychology of Personality Traits. *Journal of Human Resources, 43*(4), 972–1059.

Breuer, K. (1984). Assessing Training for Problem-oriented Information Retrieval. In Rijnsdorp, J.E., & Th. Plomp (Eds.) *Training for Tomorrow. Educational aspects of computerized automation.* Oxford: Pergamon 1984, 215–220.

Bürg, O. (2005). *Akzeptanz von E-Learning in Unternehmen. Die Bedeutung von institutionellen Rahmenbedingungen, Merkmalen des Individuums und Merkmalen der Lernumgebung für die Akzeptanz von E-Learning*. Dissertation, Ludwig-Maximilians-Universität München. Berlin: Logos.

Clune, W. H. (2002). Methodological strength and policy usefulness of cost-effectiveness research. In H. M. Levin, & P. J. McEwan (Eds.) *Cost-effectiveness and educational policy*. Larchmont: Eye on Education, 55–68.

Dolton, P. J. (2004). The economic assessment of training schemes. In G. Johnes, & J. Johnes (Eds.) *International handbook on the economics of education*. Cheltenham: Elgar, 101–163.

Edelmann, D., & Tippelt, R. (2007). Kompetenzentwicklung in der beruflichen Bildung und Weiterbildung. *Zeitschrift für Erziehungswissenschaft* (8. Sonderheft), 129–146.

Expertenkommission "Finanzierung Lebenslangen Lernens" (2004). *Finanzierung lebenslangen Lernens - der Weg in die Zukunft.* Schlussbericht. Bielefeld: Bertelsmann.

Grin, F. (2001). On Effectiveness and Efficiency in Education: Operationalizing the Concepts. *Zeitschrift für Pädagogik* (43. Beiheft), 87–97.

Hense, J., & Kriz, W. C. (2005). Bildungscontrolling und Theoriebasierte Evaluation zur Verbesserung von Bildungskonzepten. In M. Gust, & R. Weiß (Eds.) *Praxishandbuch Bildungscontrolling: Bildungscontrolling für exzellente Personalarbeit; Konzepte - Methoden - Instrumente - Unternehmenspraxis*. Oberhaching: USP Publishing, 230–242.

Homburg, C. (2002). Kostenbegriffe. In H.-U. Küpper, & A. Wagenhofer (Eds.) *Enzyklopädie der Betriebswirtschaftslehre: Bd. 3 Handwörterbuch Unternehmensrechnung und Controlling* (4. Aufl.). Stuttgart: Schäffer-Poeschel, 1052–1060.

Hummelsheim, S., & Timmermann, D. (2009). Bildungsökonomie. In R. Tippelt (Eds*.) Handbuch Bildungsforschung* (2. Aufl.). Opladen: Leske und Budrich, 93–134.

Jonas, E., Maier, G. W., & Frey, D. (2007). Psychologie des Geldes. In H. Schuler (Ed.) *Enzyklopädie der Psychologie: Serie 3 Wirtschaftpsychologie: Bd. 6 Wirtschafts-, Organisations- und Arbeitspsychologie*. Göttingen: Hogrefe, 75–148.

Kath, F. (2006). Kosten und Nutzen in der beruflichen Bildung. In F.-J. Kaiser, & G. Pätzold (Eds.) *Wörterbuch Berufs- und Wirtschaftspädagogik* (2. Aufl.). Bad Heilbrunn: Klinkhardt, 308–310.

Klauser, F. (2006). Wissenschaftliche Grundlagen zur Erforschung der Akzeptanz computer- und netzbasierter Lernangebote. In G. Minnameier, & E. Wuttke (Eds.) *Berufs- und wirtschaftspädagogische Grundlagenforschung. Lehr-Lern-Prozesse und Kompetenzdiagnostik. Festschrift für Klaus Beck*. Frankfurt: Peter Lang, 111–128.

Klauser, F., & Kim, H.-O. (2004). *Analyse der Erfolgsfaktoren für computer- und netzbasierte Lernangebote* (IMPULS EC Research Report 8). Osnabrück: Universität Osnabrück.

Levin, H. M., & McEwan, P. J. (2003). Cost-Effectiveness Analysis as an Evaluation Tool In T. Kellaghan, & D. L. Stufflebeam (Eds.) *International Handbook of Educational Evaluation. Part One: Perspectives*. Dordrecht: Kluwer, 125–152.

Lichtblau, K. (2004). Wert/Preis. In J. Ritter, K. Gründer, & G. Gabriel (Eds.) *Historisches Wörterbuch der Philosophie: Bd. 12 W-Z*. Basel: Schwabe, 586–591.

Mayer, R. (2002). Prozesskostenrechnung. In H.-U. Küpper, & A. Wagenhofer (Eds.) *Enzyklopädie der Betriebswirtschaftslehre. Bd. 3. Handwörterbuch Unternehmensrechnung und Controlling* (4. Aufl.). Stuttgart: Schäffer-Poeschel, 1622–1630.

Mühlenkamp, H. (1994). *Kosten-Nutzen-Analyse*. München: Oldenbourg.

Nübler, I. (1992). *Cost-Effectiveness of Management Training in the Informal Sector* (Discussion papers No. 101). Geneva: Training Politics Branch.

Ortner, G. E., & Thielmann-Holzmayer, C. (2006). Das Hagener Schema: Vier Kalküle, ein Wert. Gesamtheitliche Bewertung des Personalvermögens. *Das Personalvermögen, 3(*4), 18–20.

Posner, R. A. (2000). Cost-benefit analysis: definition, justification, and comment on conference paper. *Journal of Legal Studies, 29*(52), 1153–1177.

Ross, J. A., Barkaoui, K., & Scott, G. (2007). Evaluations That Consider the Cost of Educational Programs. The Contribution of High-Quality Studies. *American Journal of Evaluation, 28*(4), 477–492.

Schlicht, J. (2012). *Kosten-Nutzen Analyse von beruflicher Weiterbildung: Untersuchungen zur Wirtschaftlichkeit und pädagogischen Wirksamkeit*. Wiesbaden: Gabler.

Schmidt, F. L. (2002). The Role of General Cognitive Ability and Job Performance. Why There Cannot Be a Debate. *Human Performance, 15*(1–2), 187–210.

Schmidt, F. L., Hunter, J. E., & Pearlman, K. (1982). Assessing the economic impact of personnel programs on workforce productivity. *Personnel Psychology, 35*(2), 333–348.

Scholz, C., Stein, V., & Bechtel, R. (2004). *Human Capital Management: Wege aus der Unverbindlichkeit*. München: Luchterhand.

Schumann, J. (1984). Nutzen, Grenznutzen. In J. Ritter, K. Gründer, & G. Gabriel (Eds.) *Historisches Wörterbuch der Philosophie: Bd. 6. M - O*. Basel: Schwabe, 1008–1011.

Seeber, S. (2000). Stand und Perspektiven von Bildungscontrolling. In S. Seeber, E. M. Krekel, & J. van Buer (Eds.) *Bildungscontrolling: Ansätze und kritische Diskussionen zur Effizienzsteigerung von Bildungsarbeit*. Frankfurt: Lang, 19–50.

Seifried, J., Sembill, D., Nickolaus, R., & Schelten, A. (2005). Analysen systemischer Wechselwirkungen beruflicher Bildungsprozesse. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 101*(4), 601–618.

Sen, A. (2000). The Discipline of Cost-Benefit Analysis. *Journal of Legal Studies, 29*(52), 931–952.

Stufflebeam, D. L. (2003). The CIPP Model for Evaluation. In T. Kellaghan, & D. L. Stufflebeam (Eds.) *International Handbook of Educational Evaluation. Part One: Perspectives*. Dordrecht: Kluwer, 31–62.

Timmermann, D. (1998). Nutzen aus der Sicht der Wissenschaft. In Bundesinstitut für Berufsbildung (Eds.) *Nutzen der beruflichen Bildung. Fachtagung des BIBB am 25. und 26. September 1997* (Dokumentation). Berlin: Bundesinstitut für Berufsbildung, 75–92.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology. Toward a Unified View. *MIS Quarterly, 27*(3), 425–478.

Weiß, M. (2008). Stichwort: Bildungsökonomie und Qualität der Schulbildung. *Zeitschrift für Erziehungswissenschaft, 11*(2), 168–182.

Weiß, M., & Preuschoff, C. (2004). Kosten und Effizienzanalysen im Bildungsbereich - Referenzpapier für das Projekt "Bildungssteuerung". Retrieved at 07.11.2008 from http://www.ruhr-uni-bochum.de/sfe-hessen/Wei%DF-Preuschoff%20-%20Kosten%20und%20Effizienzanalyse%20in%20Bildung.pdf.

Weiß, R. (2009). Bildungsökonomie und Weiterbildung. In R. Tippelt (Eds.) *Handbuch Erwachsenenbildung/Weiterbildung* (3. Aufl.). Wiesbaden: VS Verlag, 367–384.

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CHAPTER III

METHODS OF INSTRUCTION IN VET

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WHAT CAN RESEARCH ON TECHNOLOGY FOR LEARNING IN VOCATIONAL EDUCATIONAL TRAINING TEACH MEDIA DIDACTICS?

INTRODUCTION

Information technology is essential in modern societies; this also applies for educational institutions, as they reflect society's (schooling) values and intentions. Learners are influenced by the use of technology; even if information technology is not always consciously or intentionally applied, it is literally an actual part of everyday life. On the one hand it is quite popular to integrate learning and technology, and on the other hand it is a necessity, even if some trends should be reflected upon critically. This paper will discuss research findings in the field of applied technology in teaching and learning by using empirical and theoretical research results related to four specific research approaches (a–d) using different IT applications and settings:

(a) Virtual Reality applications (VRLE[1]) in teaching and vocational educational training (VET) (Hillen, 2011a)
(b) Mental model approach as an underlying didactic structure in learning environments for supporting the acquisition of higher order knowledge (Hillen, 2011b)
(c) Digital gaming in teaching and training to offer and enhance learning opportunities (Hillen et al., 2011)
(d) Simulation in VET, for supporting self-regulated learning (Hillen, 2012).

Based on these four papers, a classification of media didactics will first be conducted, and conclusions related to the operative point of the IT-based learning application will then be derived. Before starting the analysis of these approaches (a–d), a brief overview of the main approaches to elements of media didactics will be given. Moreover, media didactics will be used as a reference system to shape the following analysis and discussion.

ANALYSIS AND DISCUSSION – FROM A (MEDIA) DIDACTICS POINT OF VIEW

Introduction to the Discipline of Media Didactics

Media didactics was established as a separate discipline in the 1960s, inspired by the learning theoretical model of Heiman, Otto and Schulz (1965), which is an approach

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 101–114.

in *Allgemeine Didaktik* (Terhart, 2009, p. 139). It must be said that this didactical model called a "structural model of instruction" was one milestone in establishing media didactics as a discipline. The model includes "media" as one structural element besides content, method, and teaching intention in instructional planning and analysis. Moreover, the establishment of the media didactics discipline contributed to the (further) development of media education (*Medienpädagogik*) as well. Even if the discipline of media didactics was established in the 1960s, its paradigms are still developing and changing. Some voices are precariously murmuring that because of the many reference disciplines that comprise media didactics, and because of the globalization trend, the discipline itself is in danger due to the means of its delimitation (Klebl, 2006).

Another classification approach is the orientation-to-learning theories which distinguish between behaviorist, cognitivist and constructivist media-didactics orientations (Kron & Sofos, 2003, p. 54; Tulodziecki & Herzig, 2010, p. 128). A third classification proposed by Hüther (1997) is derived by the justification of technology in relevant educational and didactical contexts: a technology-oriented approach, an emancipatory - political approach and finally an action-based and participant oriented media-didactics approach (Kron & Sofos, 2003, p. 55). New approaches in media didactics are working for the empowerment of learners and teachers (Tulodziecki & Herzig, 2010). They characterize it as the change of an approach from technology as an auxiliary tool to one of constructing complex learning environments.

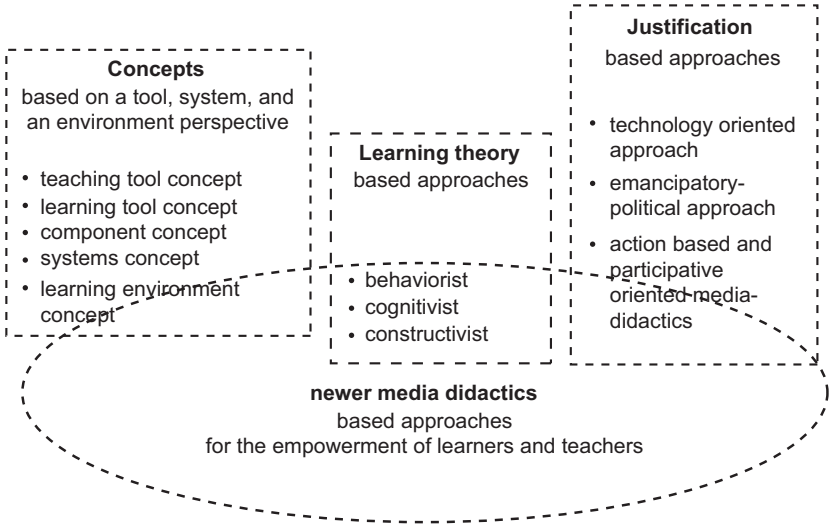

Figure 1. Approaches in media didactics.

The term "media didactics" is itself ambiguous. Thus, this paper uses a working definition for the purpose of reflecting on the approaches presented. The demarcation

of the term is influenced by Tulodziecki and Herzig (2010, p. 110ff.), who describe media didactic concepts as the relationship between instruction and the use of media. These approaches and concepts are classified by Tulodziecki and Herzig in the following manner (see Figure 1); concept of tools for teaching, concept of tools for learning, component concept, systems concept which is inspired by the Anglo-Saxon concept (Tulodziecki & Herzig, 2010). Kron and Sofos (2003) also refer to the learning theory-based approaches but add the theory of cybernetics and taxonomy of media as well as stressing the general influence which psychology as a discipline has had on media didactics. Kron (2008, p. 236) mentions that the discipline of media didactics can be seen as grounded in the reference discipline of psychology by the use of its models, and on other educational and didactical theoretical constructions.

The Application of the Classification Elements of Media Education to the Presented Approaches

The application of these classification threads in media education leads to the following classification related to the media didactic approaches (see Figure 1) mentioned above:

- *A technology-based approach using Virtual Reality applications (VRLE)*
  This application is to be described as an action-based media didactics approach to enable experience making organized as a learning environment. Hereby it makes use of constructivist principles for learning.
- *A technology-based approach using the elaboration approach*
  Even if the elaboration approach provides a didactical pre-structure, it can be classified as constructivist. It is an action-based media-didactics approach realized by an interactive learning environment. It intentionally makes use of didactic means for learning to ensure the elaboration of mental models, which is genuinely a constructivist orientation; furthermore, this indicates a concept of learning tools.
- *A technology-based approach which can make use of game attributes to offer learning chances*
  Game attributes may include the construction of subjective worlds containing objects and subjects. This approach is strongly denoted action based in addition to its containing a constructivist orientation. Nevertheless, it eventually possesses aspects of a behaviorist orientation because of procedures which are to be learnt in order to achieve new learning stages (levels). These achievements mainly target the maintenance of extrinsic motivation[2].
- *A technology approach using simulation to support self-regulated learning*
  The learning environment considers self-regulation as a decisive prerequisite as well as a result of learning. Thus, it can be described as an action-based and participative media-didactics approach which fosters and supports these skills. Moreover, it evidently becomes a concept of learning tools through the offer of

simulation tools and features to construct models to be simulated later on. Hence, it can be concluded that it also has a constructivist orientation.

Almost none of the mentioned approaches above can be classified as purely technology-oriented media didactics because they do not contain goal-oriented teaching strategies which try to accomplish pre-defined learning objectives.[3] In contrast, all of these mentioned approaches stress action-based and participation-oriented instruction because the technology serves as a tool in the hands of both partners, the teacher and the student (Hüther, 1997, p. 212).

These results are in a way not too surprising regarding research findings related to complex or rich learning environments which propose and include the use of technology. A congruency to the principles formulated for rich learning environments (Achtenhagen et al., 1992; Buzzetto-More, 2007; De Corte, 2003; Lethinen et al., 2003; Reinmann-Rothmeier & Mandl, 1999) can be confirmed. The following principles are proposed for technology-based complex learning environments:

- learner guidance and support,
- authentic assignments, tasks or problems,
- contextualized learning activities,
- the perception of being responsible for one's own learning processes,
- challenging the students to acquire different views,
- reflection on that which has been learned.

Thus, a further reflection on these approaches is needed to thoroughly examine the underlying paradigms, theories, principles, and (media) didactic models or concepts which have been applied explicitly or implicitly.

The following reflection attempts to shed light on the underlying didactics and/or applied theoretical constructs, critically asking about the contribution to the learning processes and learning results in the different technological approaches (a–d).

Discussion and Reflection on VR Application for Learning and Training

The use of VRLE is to function as one type of technological application for training and learning purposes (Hillen, 2011a). In Hillen's paper the question: "What do playgrounds and virtual reality applications (VRLE)[4] have in common?" were raised and how these applications can be supported by reflection on educational principles and learning theories. The metaphor was used to stress the aspect of experience making used by Bruner (1962) as one decisive prerequisite for learning.

Bruner (1962) stresses that "knowledge begins with enaction". The enactive theory is based on the principle that learning takes place when an individual enacts in an environment. Bruner's statement might lead to the conclusion that enaction is exclusively related to the action-based organization of knowledge; however, it should be added that enaction is just the very first stage of Bruner's described optimal learning process[5] and that iconic and symbolic representation stages follow.

The metaphor of a playground reveals the following message: A playground in a metropolitan area enables children to have a physical experience as a proxy for the missing natural environment. Instead of climbing a tree, they can climb on a rappelling tower (Hillen, 2011a). This is similar to the use of VR, where the learner can "make" experiences and acquire insights which are extremely close to reality (Inoue, 2007). Piaget's (1997) approach stresses the concept of operation. His understanding of an operation is that of "an interiorized action" (Piaget, 1997, p. 20). This can be used to justify even more strongly the importance of VRLE for learning. Piaget's approach comprises four stages (structures of operations) of the cognitive development of a child. The factor which explains the development from one structure of operation to another (beside maturation, social transmission, and equilibration) is the experience (1997, p. 19). Piaget distinguishes physical and logical-mathematical experiences. These experiences can be made by VRLEs regarding different learning objectives, which these applications imply.

Repeating the question of what users of VR applications and children on a playground have in common, it can be concluded: They can have experiences that substitute for actual experiences. By doing so, they are performing operations in terms of Piaget. These operations are a particular type of action which makes up logical structures. "These logical structures are what seem to me to constitute the basis of knowledge … Knowledge is not a copy of reality. To know an object, to know an event, is to act on it" (Piaget, 1997, p. 20).

Papert was inspired by Piaget, specifically by the concept of assimilation, which mainly focuses on the cognitive dimension in learning. He discusses that emotions or the "affective" influences learning as well as cognitive processes (Papert, 1980, p. vii). A newer concept of Breuer and Tennyson discusses how cognition, motivation, volition and emotion influence the learning process (Tennyson & Breuer, 1997, p. 117).

Print media, digital presentations, speeches, etc. address the learner rather cognitively. The sensory system of individuals can tackle more impulses. The audio sensory and kinesthetic system, spatial sensation and moreover interaction with the support of others are additional ways individuals interact and perceive their (virtual) environment.

Conclusion 1: Technology-based instruction (VR) can take place because of experience-making by the provided platforms and physical, virtual and social environments

Making experience is physical, social as well as emotional and can take place on different intellectual stages (Piaget, 1937). To evoke meaningful learning, the affective and psychomotor dimension must not be neglected. VR can offer a learning environment by involving and engaging students in activities which are emotional, cognitive, psychomotor and intuitive as well as pre-structured, planned, and spontaneous concurrently – this is very close to real life. Applied technology is therefore able to

address different kinds of dimensions of learning as well as on different intellectual[6] stages. Revisiting the discussion of a learning theory-oriented media didactics, one can assume that social constructivist orientation can be used to support the idea of the useful application of VR for educational purposes. Social constructivism does not only acknowledge the uniqueness and complexity of the learner, but actually encourages, utilizes and rewards the learner as an integral part of the learning process (Wertsch, 1988). The basic constructivist paradigm is that learning means constructing an internal representation of the world, in other words the construction of a subjective "knowledge base" from individual experiences. The social constructivist approach can be realized in VRLEs by instructional strategies, e.g. situated learning, role playing, problem-based learning and collaborative learning (Huang et al., 2010). The effects of collaborative learning can be explained in conjunction with Vygotsky's concept, the "zone of proximal development" (ZOPD) (1978, p. 86).The ZOPD is where learners are challenged close to their current level of development, i.e. their current knowledge and skills. This can be done by having the support of others, peers, teachers as well as by having an adaptive but challenging learning environment – a VRLE.

Discussion and Reflection on the Elaboration of Mental Models in Technology-Based Approaches for Achieving Higher Order Thinking

This approach highlights the learning opportunities and teaching functionalities given by the mental model approach via worksheets which shape the didactic structure of the technology-based learning environment. For the reason that mental models are (initially) naïve or flawed, it is necessary to support their elaboration didactically. Beside physical learning material, students and teachers are to be seen as part of a complex technology-based learning environment.

Questions as structural elements of worksheets can incorporate didactical functions, for instance, by posing "fruitful questions" (Nowak & Macht, 1996). These are questions about objects, questions which make reasoning necessary, questions of transfer and recall questions related to understanding. Other didactical functions of questions are impulse questions, questions which control the concentration of students or questions which can serve as instructions (how to proceed further) (Nowak & Macht, 1996, p. 18f.). In the approach discussed above, the individual elaboration process is supported by the single question as well as by the given structure of the worksheets. Nevertheless, the students work in a self-regulated manner, they can verify their learning outcomes by the computer-based simulation as well as comparing it with their former mental simulations, depicted and visualized on the worksheet before. The elaboration process can be described as an interactive, iterative, circular process using the worksheets for visualization, reporting, guiding, explanation and revision of the mental model, which is an elaboration**.**

In a computerized age, worksheets are probably perceived as old-fashioned. Hence, digital approaches have been developed which are called "interactive

web-based exercises", e.g. multiple-choice exercises, quiz-like modules, clozes etc. (Hussin, 2004, p. 33). The well known functionalities of worksheets can be adapted to construct equivalent digital versions. The question arises if these digital applications just replace paper-and-pencil applications or if they use or create new functionalities? In the first case, one can retain the paper-and-pencil approach. The latter, however, opens up new teaching opportunities and further didactical challenges. An example is the Webquest (www.webquest-forum.de) approach which makes use of the idea of worksheets[7] to structure instruction with the help of the internet and multimedia. The critical attributes of a Webquest activity include (Dodge, 1997):

- an introduction that sets the stage and provides some background information,
- a task that is doable and interesting,
- a set of web-linked information sources needed to complete the task,
- some guidance on how to organize the information, and
- a conclusion that brings closure to the quest and reminds participants of what they have learned.

Its didactic concept (Staiger, 2001) is based on self-regulated, cooperative and collaborative learning, project-oriented learning as well as on the use of authentic instructional material, etc.

Conclusion 2: Technology-based instruction needs a didactic structure or a didactic intention

Intended learning processes do not occur automatically by the application of technology: On the contrary, a concept or approach is needed to support and guide learners. This is a principle already mentioned for achieving positive learning environments. Supporting the learner means guiding him/her with regard to having the freedom to accommodate and assimilate knowledge, generate affects (motives), ask for the application of cognitive strategies (metacognitive abilities) by respecting the individual pre-dispositions of learners. These different aspects can be induced by the various functionalities of questions and the worksheets' structure. To support and foster learning, worksheets have to incorporate, for example, contextual cognitive anchors and impulses (productive questions) suggested by the didactical intention which is then implemented in the structure of the worksheets and the learning environment respectively.

Discussion and Reflection on Digital Games for Learning Purpose

Educational games are assumed to support intrinsic motivation (Martens, Diener & Malo, 2008) and as well as extrinsic motivation (Garris, Ahlers & Driskell, 2002, p. 443). The intention behind applying immersive didactics is to construct learning games which do not disturb the intrinsic motivation or prevent the volitional intentions and plans of the learner. Bopp labeled this construct "stealth teaching" (2005,

p. 5), and it includes the control of which kinds of learning situations the learner will be exposed to within a number of gaming choices the learner can make on his own: applying immersive didactics means, for instance, asking the learner to follow a learning path that makes her/him curious. This can be realized by changing the game's perspective scenario to a context known by the learner. Alternative means are the application of avatars in the game controlled by the instructor (individually adapted to the learning objectives and processes intended to support) or by the learning game (semi-automated).

Alternative didactic means are the incorporation of learning objects of a stimulating nature, as well as sequencing and concealed modeling; that is, the incorporated learning objects with a stimulating nature keep the learner exploring new problems or tasks. This idea is derived from Lewin's (1982) work.

The idea of sequencing is not new: Its root can be seen in Bloom's concept of Mastery Learning. Once the user has learned a defined set of knowledge or skills in one part of the learning game (sequence), or over the course of several sequences, you will then want to encourage the user to face all of these challenges together or in close proximity to each other (Hocking, 2002). Although this kind of sequencing is not done in a fixed order, it nevertheless respects the skills and knowledge the learner has already accomplished. This leads to a complex structure of the learning game, a factor which still provides the opportunity for the learner to maintain control of the learning game with respect to her/his interests and motives.

Concealed learning by modeling: "Fortunately, most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action" (Bandura, 1977, p. 22). This kind of concealed modeling can be offered by providing virtually accessible persons (simulated multi-user approach) as well as fictional persons incorporated in the game. Concealment can be realized through the free choice of an avatar or virtual person, whereas the personality of this person can be constructed by the learners themselves.

Conclusion 3: Technology-based instruction can make use of game attributes to offer learning chances

The overall didactical implication is that the attributes or characteristics in gaming and gaming processes, specifically the affective, are highly similar to those found in learning. To address these variables appropriately through the use of e.g. concealed learning, sequencing etc., one can additionally use the empirical findings of game design (Crawford, 2011). From empirical research (e.g. game design) it is already known that augmented or virtual reality components can increase the individual's perceived involvement.

It seems possible and wise to use learning games which can address the specific kinds of knowledge and cognitive strategies respectively, if one keeps in mind that gaming – like learning – needs the ability of the learner to be self-regulated. Hence,

the research results in the field of cognitive psychology should be applied in order to improve self-regulation in gaming for learning so as to support intended learning processes and objectives.

Discussion and Reflection on the Technology-Based Approach Using Simulation and Feedback for Supporting Self-Regulated Learning

This application of technology used a simulation-based learning environment and targeted the acquisition of higher order knowledge by offering and supporting self-regulating learning opportunities through the features of simulation and feedback (Hillen, 2012). Revisiting the quotation of Zimmerman (1989, p. 4) that states, "Students can be described as self-regulated to the degree that they are meta-cognitively, motivationally, and behaviorally active participants in their own learning process", we can concluded that to support metacognitive learning processes, the individual learners need a platform to apply their strategies, for instance, to reflect on their learning achievement. These processes would not be possible to support without feedback, e.g. by visualization features (tables, graphs etc.) of the simulation-based learning environment. Several studies have additionally been investigating pre-knowledge related to the use of self-regulated strategies. Studies by Winters et al. (2008) found in particular that students who are more academically successful tend to use more effective strategies when learning with a technology-based learning environment than those with lower levels of pre-knowledge. In addition, their investigations showed that students with higher pre-knowledge tend to engage in greater instances of planning and monitoring.

To summarize, one can say that students with lower pre-knowledge levels use only a few specific self-regulation strategies (such as summarizing and note taking). These students seldom apply active strategies, such as making inferences or elaborating on their knowledge. Students with higher pre-knowledge tend to have an internal locus of control which indicates higher self-regulation (MacGregor, 1999).

Conclusion 4: Technology-based learning approaches (simulation) can support self-regulated learning by respecting prior knowledge

Planning, organizing and conducting evaluations are the typical characteristics of a self-regulated learner. As discussed above, in order to benefit from the support of metacognitive learning processes, an individual learner needs a platform to apply his strategies, e.g. reflecting his learning achievement. But there is an aspect to be respected, too, a procedure or stage inherent in the application of self-regulated learning strategies (Simons, 1992): Firstly, learning has to be prepared (pre-knowledge has to be activated). Secondly, the act of learning has to be conducted, and finally, learning has to be regulated by the use of control and evaluation strategies to maintain the motivation and concentration on a learning task or a learning procedure.

If one looks at the activities required and supported by the simulation-based approach and the following three activities (Simons, 1992), they seem to match each other:

1. The activation of pre-knowledge can be supported by the visualization of the naïve mental model as a technical model by the simulation software.
2. The simulation of the technical model which leads to the presentation of the model behavior (feedback) using the visualization features (table function, behavior over time, graphs, etc.). This might cause cognitive conflicts, which again …
3. … lead to further control and evaluation activities of the student that are demanded by the simulation and interpretation or explication of the results.

Self-regulated learning can therefore be assumed to be supported by such simulation-based approaches but one has to keep in mind the role of pre-knowledge (see previous section) for the application of self-regulated strategies.

SUMMARY

Even if the discussed applications of technology for learning range over a broad bandwidth caused by the related frameworks and constructed settings for instruction, the discourse leads to four conclusions regarding the different approaches presented:

(1) Technology-based instruction by VRLE can take place because of experience making. Didactical recommendations are the orientation to social constructivist learning as well as the application of the paradigm of ZOPD, e.g. by a collaborative VRLE with real or virtual participants.

(2) Technology-based instruction needs a didactic structure or didactic intention to support the acquisition of higher order knowledge by respecting opportunities for self-regulated learning. For instance, web-based teaching uses a didactical concept called Webquest which offers an instructional structure through its recommended critical attributes, e.g. guidance to organize retrieved information.

(3) Technology-based instruction can make use of game attributes to offer learning opportunities by using immersive didactics or stealth teaching for an appropriate use of the "flow" of the learner, and finally

(4) the simulation feature can contribute to support self-regulated learning if taking prior knowledge into account.

It appears that concepts and phenomena already well known in didactics, pedagogy[8] and education can be used for the purpose of media-based instruction, as shown in Bruner's theory of "experience making" if applied in a proper didactical manner. Media didactics might contribute to these analytical research results (if applying didactic concepts and models/theories) by making media-based instruction more transparent and hence scientifically accessible for evaluation. We refer to Tulodziecki (2005), who criticizes the lack of theoretical foundations in research and development in the context of media didactics. Figure 1 shows that the newer media didactic approaches make explicit use of existing approaches and concepts,

e.g. participation-oriented as well as learning environment approaches. The phenomenon of keeping motivation, e.g. by "gaming", is not new, but the challenge is to design an appropriate and applicable didactical approach for learning. Researchers are developing design patterns for educational games based on pedagogical[9] models (Maciuzek & Martens, 2010, p. 265). Another example is immersive didactics (e.g. stealth teaching in gaming for learning), but this must be further developed because, as aforesaid, gaming also requires self-regulation skills.

Finally, despite the fact that a general statement made by Haft (1988) on (media) didactics is over twenty years old, it depicts the current situation perfectly: "Online technology is speeding up, but didactics is lagging behind" [transl. by the author].

NOTES

1 VRLE= Virtual Reality Learning Environment.
2 Extrinsic motivation = i.e., the learner engages in the activity because he or she desires the outcome and values it as important (Garris, Ahlers & Driskell, 2002, p. 443).
3 Game-based learning may contain pre-defined learning objectives.
4 Focusing on educational issues and strategies applying VR, the term 'Virtual Reality Learning Environment' (VRLE) and virtual reality learning systems (Fitzpatrick, 2007; Inoue, 2007) are used.
5 Bruner's model consisted of three interlinked and integrated stages; enactive, iconic and symbolic representations for the organization of knowledge.
6 The word intellectual is used with the intention to avoid the double meaning of cognitive as a procedure and dimension of human learning and as stages of development.
7 http://www.webquest-forum.de/infos/lernprogramm/arbeitsblatt/arbeitsblatt.html
8 See footnote 9.
9 The Anglo-Am. concept of pedagogy is the closest to the European understanding of didactics.

REFERENCES

Achtenhagen, F., Tramm, T., Preiß, P., Seemann-Weymar, H., John, E.G., & Schunck, A. (1992). *Lernhandeln in komplexen Situationen. Neue Konzepte der betriebswirtschaftlichen Ausbildung*. Wiesbaden: Gabler.

Bandura, A. (1977). *Social Learning Theory*. New York: General Learning Press.

Bopp, M. (2005). Immersive Didaktik: Verdeckte Lernhilfen und Framingprozesse in Computerspielen. *kommunikation@gesellschaft, 6*(2), 2–12.

Bruner J. (1962). *On knowing: Essays for the Left Hand*. Cambridge, MA: Harvard University Press.

Buzzetto-More, N. A. (Ed.) (2007). *Advanced principles of effective e-learning*. Santa Rosa: Informing.

Crawford, C. (2011). Retrieved 04 of March 2012 from http://library.vancouver.wsu.edu/sites/library.vancouver.wsu.edu/files/ACGD.pdf.

Dodge, B. (1997). *Some thoughts about WebQuests*. Retrieved March, 17th, 2012 from http://webquest.sdsu.edu/about_webquests.html.

De Corte, E. (2003). Konstruktion von Lernumgebungen zur Unterstützung einer produktiven Wissensnutzung. In F. Achtenhagen, & E. G. John (Eds.) *Meilensteine der Berufsbildung*. Vol. 1. Bielefeld: Bertelsmann, 227–238.

Fitzpatrick, J. J. (2007). *Interactive virtual reality learning systems: Are they a better way to ensure proficiency?* Retrieved February 1st, 2008 [http://www.vrmariner.com/vr_learning.html] not retrievable anymore.

Garris, R., Ahlers, R., & Driskell, J.,E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming, 33*(4), 441–467.

Haft, H. (1988). Einführung: "Neue Medien und Sozialisation - Die Technik rennt, die Forschung humpelt. *Unterrichtswisenschaft, 16*(4), 2–6.
Heimann, P., Otto, G., & Schulz, W. (1965). *Unterricht, Analyse und Planung*. Hannover: Schroedel.
Hillen, S. (2011a). *Virtual Reality/Augmented Reality – Applications for Educational Purposes?* Project Development of Vidzeme Continuing Education Technology Centre, Valmiera: SIA MCabols, 61–64.
Hillen, S. (2011b). The role of worksheets in media based instruction - a didactic and diagnostic approach In S. Hillen, T. Sturm, & I. Willbergh (Eds.) *Challenges facing contemporary didactics*. Münster: Waxmann, 169–184.
Hillen, S. (2012). Acquisition of higher order knowledge by a dynamic modeling environment based on the educational concept of self-regulated learning. *Intelligent and Adaptive Educational-Learning Systems: Achievements and Trends: Smart Innovation, Systems and Technologies*. KES-Springer Verlag Book Series. Berlin: Springer, 393–416.
Hillen, S., Breuer, K., & Tennyson, R. D. (2011). Gaming and Learning. In S. Hillen, T. Sturm, & I. Willbergh (Eds.) *Challenges facing contemporary didactics*. Münster: Waxmann, 185–198.
Hocking, C. (2002). *Level Design. Bonus material of Tom Clancy's Splinter Cell*. DVD for Xbox, UBI Soft.
Huang, H.-M., Rauch U., & Liaw S.-S. (2010). Investigating learners' attitudes toward virtual reality learning environments: Based on a constructivist approach. *Computers & Education, 55*, 1171–1182.
Hüther, J. (1997). Mediendidaktik. In Hüther, J., & Anfang, G. (Eds.) *Grundbegriffe der Medienpädagogik*. München.
Hussin, S. (2004). Web-Based Language Learning Materials: A Challenge. *Internet Journal of e-Language Learning & Teaching*, *1*(1), January 2004, 31–42.
Inoue, Y. (2007). Concepts, Applications, and Research of Virtual Reality Learning Environments. *International Journal of Human and Social Sciences, 2*(1), 1–6.
Klebl, M. (2006). Retrieved 21st of March 2012 from http://www.medienpaed.com/2006/klebl0607.pdf.
Kron, F. W. (2008). *Grundbegriffe der Didaktik*. München: Reinhardt.
Kron, F., & Sofos, A. (2003): *„Mediendidaktik - Neue Medien in Lehr- und Lernprozessen"*. München: Reinhardt.
Lethinen, E., Lehti, S., & Salmi, S. (2003). The challenge of ICT in vocational education. In F. Achtenhagen, & E.G. John (Eds.) *Meilensteine beruflicher Bildung*. Bd. 1. Bielefeld: Bertelsmann, 259–296.
Lewin, K. (1982). *Umweltkräfte in Verhalten und Entwicklung des Kindes*. In F. E. Weinert, & H. Gundlach (Eds.). *Kurt-Lewin Werkausgabe,* Bd. VI, Bern, 169–210.
Maciuzek, D., & Martens, A. (2010). Patterns for the design of educational Games. In M. Edvardsen, & H. Kulle (Eds.) *Educational Games: Design, Learning and Applications*. New York: Nova.
Martens, A., Diener, H., & Malo, S. (2008). Game-based Learning with Computers - Learning, Simulations, and Games, in Z. Pan, A. D. Cheok, & W. Mueller (Eds.) *In Transactions on Edutainment I*. LNCS. Berlin: Springer, 172–190.
MacGregor, S. K. (1999). Hypermedia navigation profiles: Cognitive characteristics and information processing strategies. *Journal of Educational Computing Research, 20*(2), 189–206.
Nowak, J. R., & Macht, K. (1996). *Die Kunst des Fragens. Theorie und Praxis der Frage als didaktisches Steuerungsinstrument*. Augsburg: Dr. Wißner.
Papert, S.. (1980). *Mindstorms: Children, Computers, and Powerful Ideas*. New York: Basic Books.
Piaget, J. (1997). Development and Learning. In Gauvain, M., & Cole, M. (Eds.) *Readings on the Development of Children*. 2. New York: Ed. Freeman, 19–28.
Piaget, J. (1937). *La naissance de l'intelligence chez l'enfant. The birth of intelligence in the child*. Oxford: Delachaux & Niestle.
Reinmann-Rothmeier, G., & Mandl, H. (1999). *Unterrichten und Lernumgebungen gestalten*. Forschungsbericht 60, München: Ludwig Maximilians-Universität.
Simons, P. R. J. (1992). Lernen selbständig zu lernen - ein Rahmenmodell. In H. Mandl, & H. F. Friedrich (Eds.) *Lern- und Denkstrategien: Analyse und Intervention*. Göttingen: Hogrefe, 251–264.

Staiger, S. (2001). Webquests. Eine neue didaktische Methode zum Interneteinsatz: Unterrichtsprojekte am technischen Gymnasium und in der Berufsschule. In *Computer und Unterricht. Anregungen und Materialien für das Lernen in der Informationsgesellschaft, 44*/2001, 52–57.

Tennyson, R. D., & Breuer, K. (1997). Psychological Foundations for Instructional Design Theory. In R. D. Tennyson, F. Schott, N. Seel, & S. Dijkstra (Eds.) *Instructional Design: International Perspectives, Vol. 1: Theory, Research, and Models*. Mahwah, N.J.: Lawrence Erlbaum Ass., 113–134.

Terhart, E. (2009). *Didaktik. Eine Einführung*. Stuttgart: Reclam.

Tulodziecki, G. (2005). *Zur Situation der Medienpädagogik in der Bundesrepublik Deutschland*. Retrieved 12th of March 2012 from http://www.medienpaed.com/05-1/tulodziecki05-1.pdf.

Tulodziecki, G., & Herzig, B. (2010). *Handbuch Medienpädagogik. Band 2: Mediendidaktik. Medien in Lehr- und Lernprozessen*. München: koepaed.

Winters, F. I., Greene, J. A., & Costich, C. M. (2008). Self-regulation of learning within computer-based learning environments: A critical analysis. *Educational Psychology Review, 20*(4), 429–444.

Vygotsky, L. S., (1978). *Mind in society: The development of higher mental processes*. Cambridge: Harvard University Press.

Wertsch, J. V., (1988). *Vygotsky and the social formation of the mind*. Cambridge: Harvard University Press.

Zimmerman, B. J. (1989). Models of self-regulated learning and academic achievement. In B. J. Zimmerman, & D. H. Schunk (Eds.) *Self-regulated learning and academic achievement. Theory, research and practice.* New York: Springer, 1–25.

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TECHNICAL DISCUSSIONS AS SUPPORTIVE INTERVENTIONS IN THE PROCESS OF CONSTRUCTIVIST TEACHING AND LEARNING

PRELIMINARY CONSIDERATIONS AND STARTING POINT

Over time, theories regarding the nature of learning have changed significantly. For two or three decades, a change of didactic paradigm towards a constructivist attitude on learning has been taking place (see Riedl, 2010, p. 100). In vocational classes constructivist learning can be realized by the use of active learning concepts. Even though the empirical evidence does not unconditionally endorse active learning in industrial-technical vocational training (for a summary, see Nickolaus, Riedl & Schelten, 2005; Nickolaus & Pätzold, 2011), this way of teaching is – due to its integrated support of expert knowledge and methodical, social and emotional competences – a key concept of modern vocational education (Arnold & Gonon, 2006, p. 211). A balance between lessons based on an autonomous, learning-centered knowledge construction and lessons based on teacher-led instructions is one of the key challenges to everyday teaching in constructivist learning. In this case, it depends on how the teacher supports individualized, student-centered learning phases. Further, it depends on the teacher`s success in cognitively activating the students (Riedl, 2011, pp. 103, 107).

Apart from the modified interpretation of learning processes, however, empirical knowledge of teaching efficiency has also changed. Until the end of the twentieth century, publications concerning meta-analyses of empirical studies repeatedly questioned the positive impact of school and teaching on learning (for a review of the results and a critical reflection, see Weinert, 2001, pp. 73–76).[1] Today, the current state of empirical studies on teaching points in another direction and shows: "Modern, profession-oriented, cognitively activating lessons during which the time available for learning is indeed used for teaching and during which the students (led by the teacher) have to deal with challenging but manageable tasks, have far more positive effects on learning efficiency than has been assumed in the past" (Köller, 2012, p. 7). Thus, it can also be recognized that didactic measures (which can either be assigned to constructivism or to objectivism) have notable effect sizes on learning

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progress, when they are used at the right point in the lesson and if these measures are of correspondingly high quality.

Köller (2012), summarizing Hattie (2009),[2] particularly points to the fact that a change of the conditions of the lessons, "which typically have political priority for education policies (e.g. reduction of the number of students per class, school structures), are irrelevant to a great extent" (p. 77). Thus, learning success, here in respect to the students' acquisition of knowledge, primarily depends on variables which are to be understood as the underlying structures[3] of lessons.

Studies carried out within the Munich-based research program so far have largely been dedicated to highly developed, action-oriented lessons in technical vocational education. In these usually individualized lessons, students learn through complex tasks which are occupation specific. Here, the students should be supported by the teacher in a way that best meets their requirements. Numerous results obtained from individual studies are mutually corroborative. However, specific individual results must also be considered (for a summary, see Riedl & Schelten, 2011). The different studies pursue their research questions on the basis of widespread methodological approaches,[4] which often include aspects of design-based research (see Euler, 2011, pp. 530ff.). The process analyses of technical active learning concepts at vocational schools as well as parallel impact evaluations concerning the process character of constructivist learning show that the lessons considered were largely successful. Besides the positive effects, however, there is still potential for optimizing the teaching-learning arrangements. Concrete suggestions for possible improvements can be deduced from the specific weaknesses identified in particular lessons. Here, the focus is on recommendations for the role and the communicative behavior of the teacher, guidelines for self-learning materials and organizational teaching recommendations.

A current research emphasis outlined by this article builds on Buchalik (2009), whose research approach concentrated on identified demand on individual communicative support of students in student-centered lessons. Furthermore, this approach makes an explorative contribution to the process, general features and possible effects of technical discussions as teacher-student communication in systematically student-centered lessons. Here, the subject area analyzed is created by four proven, high-quality teaching concepts of the professional fields of electrical engineering, information technology, metal technology as well as nutrition and home economics. Each of these teaching concepts were developed over a period of many years. The research identifies the actual state of the teacher-student communication within this concept of teaching by analyzing these case studies using different research questions in exemplary form. Procedural aspects studied include how much time of the overall lesson is used for technical discussions, how often technical discussions are initiated by the teacher and/or the students and how conversation sequences during a technical discussion are distributed between the teacher and the students. Functional aspects studied include targeted cognitive processes and activated knowledge types, both intended to foster learning during technical discussions.

Buchalik transfers the data collected to a self-developed set of categories (ibid., p. 112). This set of categories transfers categorizations with respect to cognitive processes (Anderson & Krathwohl, 2001, with the revised taxonomy of Bloom) as well as knowledge types in lessons (Schelten, 2010) to the didactic variable "technical discussion". The different types of knowledge refer to factual knowledge, causal knowledge and procedural knowledge. According to this system, cognitive processes during lessons can be divided into remembering, understanding, applying, analyzing, evaluating and constructing.[5] This set of categories helps to better define the term "technical discussion", which has been defined in a relatively general way so far. It thus helps to set up objectives regarding technical discussions as a didactic requirement for a successful teacher-student communication in constructivist lessons of technical training (see also Riedl, 2011, pp. 211ff.).

Buchalik's results (2009) concerning the analysis of technical discussions are very complex.[6] The study clearly proves the function of technical discussions as an essential part of action-oriented lessons which, at the same time, support self-organization. Here, both obligatory dialogues as well as facultative dialogues can show a high content level corresponding to the objectives. In the analyzed discussions, teachers usually dominate in teacher-students communication. This holds true both for initiating technical discussions as well as the quantity of verbal input to the dialogues. Generally, the observed technical discussions show high potential for profound and complex conversational situations which are considered to be positive for the efficiency of learning. As far as the quality is concerned, the research results imply an impact of teaching concept on cognitive processes and knowledge types. For instance, the research results regarding technical domains point to the extreme importance of declarative-systemic knowledge and cognitive processes demanding the analysis of vocation-specific situations.

Further conclusions can be drawn from the dominance of teachers in technical discussions which Buchalik identified (2009, pp. 192f.). Scheduled technical discussions during the lesson (e.g. suggestions in the guidance texts) foster this trend. Technical discussions which evolve on the spur of the moment from the students' problem solving tend to show a higher proportion of both student initiative and student participation. The clear dominance of teachers concerning quantity and time of speech acts results in two lines of argumentation (see ibid.). On the one hand, even teachers with long experience in active learning concepts are often observed to relapse into traditional instructive monologue communicative patterns, even though technical discussions do particularly aim at students` individual learning. On the other hand, the teacher does have a role as moderator of the teacher-student group. Here, the teacher is responsible for the integration and possible correction of contributions made during the discussions as well as for the results of learning. This role can require a higher proportion of speech acts. Furthermore, the data collected from the field of electrical engineering suggest that these results do not correlate to the teacher's personality.

TECHNICAL DISCUSSIONS DURING LESSONS

Didactic objectives of technical discussions

Technical discussions are the communicative assistance rendered by a teacher. They take place in a student-centered[7] learning environment in which students act autonomously to a great extent. Here, two determinants[8] – definable with respect to the lesson's organization – have a key function. These determinants have a significant influence on the learning process and success (Riedl, 2005, pp. 258f.). From the point of view of the organization of lessons, these determinants are both self-learning materials for students (1) as well as supporting interventions by the teacher (2). The individualized dialogue between teacher and individual students or small groups aims at a high-quality communication in class, which can refer to both the learning material and the learning process. This is based on the assumption that the communication in class is particularly supportive of learning if high-quality questions demand high-quality replies and thus profound explanations. In qualitatively demanding conversational situations, students have to structure and organize their knowledge in order to verbalize it. This supports the construction, strengthening and structuring of new cognitive concepts. Various studies of communication in class prove the correlation between the quality of the questions asked by the teacher and the quality of students' comprehension. Furthermore, the frequency and the quality of the questions asked by students depend on the social form of teaching. According to this, teaching in small groups encourages content questions. Timid students tend to ask significantly more questions in small groups than in teacher-centered classes. All in all, the number of questions increases considerably in this social form. At the same time, the quality of questions improves due to the fact that more questions require explanations rather than short answers.[9]

Technical discussions are an important didactic element in a student-centered lesson and they are crucial to high quality communication. Specific communication possibilities arise due to the often long-term learning in small groups working with challenging tasks and problems. Compared with teacher-centered lessons, technical discussions in student-centered lessons enable the teacher to demand more reflections about analyses and syntheses of the contents. At the same time, the teacher can focus on aspects of argumentation and contexts of explanation regarding the topics covered. Thus, cognitive processes can be initiated which encourage in depth reflection of learning contents. In action-oriented vocational teaching, causal knowledge for the theoretical support of vocational proficiency has priority (Schelten, 2011).

During the process of active learning, students tend to a final orientation of their learning actions (Riedl & Schelten, 2011, p. 151). As far as this final orientation is concerned, the students want to achieve the required aims directly and within a short period of time. Their learning aims at a practical sequence of the theory-based tasks. From the students' point of view, the legitimate aim is the success of their actions and not primarily the theoretical knowledge of contexts and origins. Regularly

scheduled technical discussions, however, can solve this problem as they demand reasoning and encourage the students to reflect on their actions theoretically, even if this is not absolutely necessary. In a complex teaching-learning environment, technical discussions are a crucial didactic scaffolding instrument. For knowledge acquisition during lessons they maintain balance between construction and instruction in a learning approach which is open to self-organization. Due to this balance, constructivist learning becomes effective and has a positive effect on the students' learning progresses. Once a culture of technical discussions in class has been established, it rapidly becomes clear to the students that the teacher will repeatedly demand theoretical arguments concerning practice-oriented learning actions. Students are interested in the acquisition of basic knowledge and contexts of argumentation if this is called for by the pedagogical organization of the lesson. In technical discussions, the focus is on theoretical aspects of learning actions with causal explanations.

Function of technical discussions

Technical discussions in student-centered and active learning arrangements aim at the regulation of the students learning process by initiating individual reflecting and understanding processes. In the content-related dialogue, they refer to the learning items, the process of learning and the organization of learning. In the broadest sense, this can also include social processes if they have an effect on the content learning processes. Administrative communication content, however, cannot be categorized under the term "technical discussion".

The diagnostic function of technical discussions should provide the students and teachers with information on the individual's learning progress. Thus, the teacher can take measures to encourage the individual student's learning progress. The students get to know their achievement level as well as their deficits. However, technical discussions must not be perceived by the students as an exam situation[10] or as a performance appraisal, because the anxiety associated with such a situation would significantly lower the possible learning potential of these conversations. In addition, in technical discussions and/or by the reaction of the students towards the teaching/learning materials prepared, the teacher gains information on the structure of the learning environment which can thus be optimized. Diagnostic elements of technical discussions influence their control function by regulating the teacher's monitoring actions.

Long-term active learning in individualized small groups changes the form of communication compared with instructive forms of teaching with the whole class. The students can ask significantly more questions. They overcome their inhibitions to ask a question. At the same time, the depth and thus the quality of questions increase. In such situations, the higher proportion of speech acts shifts from teachers to students. A technical discussion in class can be initiated by the teacher, the students, or structurally by tips or requests in the self-learning materials. The teacher

initiates a technical discussion if he or she wants to gain information on the students' learning progress or if further support is required for progress in learning. The teacher can rely here on his/her teaching experience if students are repeatedly faced with particularly difficult progressive stages in problem solving which require support. However, students can initiate technical discussions themselves if they need support for current problems and unresolved questions. Structurally predefined technical discussions during predetermined content phases serve to give teachers and students feedback on knowledge acquisition in a complex learning situation. Furthermore, they help to formally close a learning sequence. The teacher's role during technical discussions must ideally be understood as the role of a "senior researcher" who takes part in the problem-solving process, who regulates the discussion and who attends to the use of adequate technical terminology and content correctness without presenting a final solution to the problem (Buchalik 2009, p. 45). The teacher can of course also be assigned responsibility for systematic dissemination of knowledge through direct individual instruction when the teacher diagnoses knowledge gaps which can thus be rapidly filled.

Efficiency of technical discussions during the lesson

Regarding learning efficiency, technical discussions in action-oriented lessons can be analyzed using various categories, which are, in empirical studies, repeatedly referred to in cause-and-effect context for successful learning. From the predicators taken into consideration, conclusions concerning their relevance within a moderately constructivist learning approach can be drawn. The influencing variables cited by Köller (2012) (according to the work of Hattie, 2009) serve as the categories mentioned below. According to this, only some rather weak to moderate variables influencing learning performance arise for features, typical of constructivist learning in action-oriented lessons. Köller (ibid.) shows their effect sizes in several summaries.[11] Individualized forms of learning (d = 0.22), discovering learning (d = 0.30) or inductive lesson structure (d = 0.33) show rather weak effects. Slightly larger effects can be seen e.g. in cooperative forms of learning (d = 0.41) which take place in small groups (d = 0.49).

According to the results obtained from Hattie's study, constructivist learning in action-oriented lessons can develop its efficiency in particular by means of the didactic variable "technical discussion", presented in this paper. This communicative assistance rendered by the teacher can be assigned to different variables, which are highly effective in successful learning (see Köller, 2012, Table 5, p. 77). Technical discussions demand task-related, elaborating cognitive activities from the students. Here, various types of feedback have positive effects on knowledge acquisition (feedback, d = 0.73, formative evaluation d = 0.90). Such feedback encourages "the cognitive support of the students by the teacher. Feedback is always task-related and provides information to the students about their knowledge and shows possibilities to further increase." (ibid.). Similar effects can be achieved by

a positive teacher-student relationship (d = 0.72) if teachers and students set their sights on the same objectives, and if the students have confidence in the teacher's assistance, which should be competent regarding both skills and pedagogical knowledge.

UNIVERSITY TEACHER TRAINING FOR TECHNICAL DISCUSSIONS

Working hypotheses

At this point in time, the Munich research program on teaching-and-learning processes in industrial-technical vocational education (Riedl & Schelten, 2011) is developing Buchalik's results, in particular, on using them for teacher training. This research approach aims at enlarging the empirical knowledge base on technical discussions which has been established at the Technical University (TU) of Munich. The second goal is the implementation of this didactic variable in everyday teaching-and-learning in technical vocational education. Here, the studies build on Buchalik's hypothesis, which he deduces from the study results: "Appropriate training measures for teachers increase content quality of technical discussions" (2009, p. 200). This assumption can be linked to another statement made by Buchalik when he emphasizes that a modern teaching-and-learning structure depends on constructivist learning in regular, student-centered phases. Therefore, routine high-quality teacher-student communication in technical discussions is an essential requirement for self-organized learning (ibid.). Buchalik also points to the high domain specificity of technical discussions (ibid., p. 189).

Concept

Towards the end of the university program, students studying to become teachers of metal technology at vocational schools have the opportunity to do a traineeship in "automation technology: workshop programming" (WOP). Implemented as a seminar, this entails six credit hours on one morning per week over the space of 12 weeks. The highly motivating seminar contains tutor-initiated instructive phases as well as a high ratio (about 70%) of active self-learning phases.[12] This traineeship provides prospective vocational teachers with insights into the structure and programming of modular facilities. At the end of the traineeship, students should design and implement feasible multi-stage systems. The participants can include the marks for this seminar (6 ECTS) in the vocational teaching program of metal technology. This seminar takes place at the Munich-based vocational school of manufacturing technology and is carried out by a teacher[13] of the school who is, at the same time, a lecturer of the TU Munich for this seminar. An integrated classroom for lessons in automation technology at the vocational school is available for this traineeship (concerning equipment, see e.g. Schelten, Riedl & Geiger, 2003).

The technical contents of the traineeship are divided into twelve interlocking modules (see Liebelt, 2011, pp. 35ff.). Didactic and methodology are similar to those within vocational training. Thus, the seminar presents exemplary active learning concepts regarding automation technology at vocational schools as its pedagogical concept. The focus in this traineeship has almost exclusively been on subject-related contents. However, as this traineeship is contextually and methodologically strongly related to teaching, the students are offered the opportunity of also taking a closer look at the didactic side of domain-specific automation technology and reviewing it with other participants.

The initiative for a modified seminar concept emerges from the further development and utilization of Buchalik's research results (2009) on the subject of technical discussions. As the tutor is also interested in this objective, two former participants of this seminar had the opportunity of further conceptional development of this seminar with the aim of integrating didactic considerations regarding technical discussions in action-oriented automation technology lessons. At the same time, this pilot study will evaluate the modified conception. Implemented in the winter semester 2010/2011, the modified traineeship concept included four additional learning concepts (see Plankl, 2011, p. 75ff.). These additional learning units, developed in close coordination with the tutor and the scientists of the TU Munich are carried out by the latter. The additional course modules contain a total of 12 lessons. They include theoretical and practical considerations in implementing technical discussions in the domain of automation technology. They aim to acquaint the students with the development of technical discussions. They also want to point out didactically important features by video analyses of conversation situations.

Of the four additional units, unit 1 first presents the objectives of the additional learning units and provides basic information about the term "technical discussion". Unit 2 discusses the results of Buchalik's studies (2009), involves the development of crucial features of technical discussions by means of a video example and emphasizes their relevance for everyday teaching. Unit 3 first addresses Buchalik's categories theoretically in order to classify cognitive processes and knowledge types in technical discussions. The next step is the practical implementation by the coding of paradigmatic video-recorded sequences of conversation. Unit 4 aims especially at individual experiences in leading technical discussions. The participants learn to conduct competent technical discussions in learning phases in which they alternately take on the role of the teacher and the student. The subject under discussion is their preceding technical work concerning automation technology. The technical discussions are video recorded and then reflected on, together with the scientists of the TU Munich. There are five video-recorded technical discussions.

Evaluation

The evaluation of the additional course units concerning conducting technical discussions uses different approaches. The video-recorded sequences of the technical

discussions are evaluated by categorizing the existing knowledge types and cognitive processes (see above). In addition to this there is a focused interview after the last sequence of technical discussions as well as a written survey of the students on quality and efficiency of the course units (regarding the survey instruments, see Liebelt, 2011 and Plankl, 2011).

The data collected from the three evaluation approaches are mutually corroborative. The students verify that the additional course units were advantageous for them. However, due to the relatively short period of time available, it became clear that there are restrictions regarding to the depth and completeness of the didactic content of the courses. Nevertheless, substantial student development was shown in the increasing quality of the technical discussions conducted by them during the course. The basis of this finding is also shown in the increasing technical knowledge concerning automation technology, didactic insights into conducting technical discussions and growing interest in this subject. The five recorded technical discussions have the following running times (minutes:seconds): Technical discussion 1 – 1:11, Technical discussion 2 – 1:58, Technical discussion 3 – 2:08, Technical discussion 4 – 10:50, Technical discussion 5 – 7:11. The content evaluation using Buchalik's (2009) categories of cognitive processes and knowledge types (see also Riedl, 2011, p. 211ff.) shows an increasing number of categories as the course progresses, which shows a greater variety of coded cognitive processes and knowledge types. In technical discussion 1, recorded on the first training day, only the cognitive processes of remembering and understanding in the field of factual knowledge occur. In technical discussions 2 and 3 – recorded in the second course unit – all types of knowledge of the pattern of categories are already recognizable and occur together with analyzing and applying cognitive processes. Technical discussions 4 and 5 – recorded in the fourth and last course unit – show all knowledge types and all five cognitive processes realizable for vocational schools at least once during each sequence of the technical discussion. Liebelt and Plankl (2011, p. 106) trace this effect mainly to the students' modified sensitization and interpretation of their role as the teacher. This evaluation once more confirms the fact that the competent conducting of technical discussions requires technically skilled teachers. In the recorded sequences of the technical discussions, the students especially were able to assume the teacher's role competently and had high-quality technical discussions, containing the required technical expertise in the domain of automation engineering in a conversational context.

PROSPECTS

"If you want to increase pupils' success in learning in the long run, the lesson itself seems to be the decisive influencing variable. Associated with this are systematic, long-term programs for the professionalization of teachers." (Köller, 2012, pp. 77f.). For a change to a teaching-and-learning culture that relies on successful self-organized learning in class, regular teacher-student communication in terms of

high-quality technical discussions is a fundamental requirement. University teacher education gives access to the development of teaching skills in class in terms of technical discussions in student-centered lessons. This competency development must build on a university education program in which the theoretical groundwork of constructivist learning in a student-centered active learning environment has already been laid. Another target group for competency development regarding conducting technical discussions are teachers in everyday teaching practice. They have to be sensitized and attuned to their modified responsibilities, which particularly arise in class communication in a student-centered environment. The magnitude of these challenges is accentuated by Buchalik (2009, p. 199) who points to the fact that implicitly existing and traditional teacher-pupil conversational patterns still significantly moderate or even impair the quantity and quality of the communication in classes.[14]

Science and practice are only beginning to recognize the significance of technical discussions as a didactic variable in modern student-centered classes. "Technical discussions have developed into a new pedagogical challenge for vocational schools. Thus, vocational schools prove their modern teaching methods and give direction to educational science" (Schelten, 2006, p. 107). Integrating a culture of technical discussions into the lessons must be regarded as a long-term task of modern vocational education.

NOTES

1 Here a crucial role in students' development and education is ascribed to other variables, such as the students' genetic condition, domestic environment, social background and education duration.

2 Here, results obtained from empirical research on teaching were compiled from over 800 meta-analyses of more than 50,000 studies.

3 Compared with surface structures (e.g. social form, team teaching, open learning) which can be simply and objectively observed, underlying structures are hard to identify and often become apparent only through situational analyses of a learning phase. Underlying structures constantly encourage students' cognitive activation.

4 Together with the results, they are shown in detail in the respective publication. Nickolaus, Riedl & Schelten (2005, pp. 512–515) give an insight into the scientific methods of the individual publications. These publications are described by Riedl & Schelten (2011).

5 The category "Constructing" refers to extremely challenging and complex demands on engineering, using Anderson and Krathwohl's theory (2001, p. 84ff.). The process of construction results in a new, challenging development which serves as a solution for a wider range of responsibilities. However, this is probably not feasible at vocational schools.

6 For a review of results, see Buchalik & Riedl (2009).

7 Student-centered teaching can be action-oriented and can foster constructivist learning. However, this is not necessarily the case. The idea of student-centered teaching is broadly defined and includes teaching methods in which processes of learning are individualized in the long run and in which self-learning materials as well as the teacher-student communication in technical discussions are important.

8 Other influencial variables concerning the process of learning are, e.g.; the learning requirements of the students with their prior knowledge, the teaching requirements of teachers, and extracurricular influences such as training in companies.

9 Results of previous research are summarized by Buchalik (2009).

[10] See Breuer & Schmidt (2010).
[11] The evaluation of effect size d refers, regarding the results cited by Köller (2012), to the increase in learning within one school year in secondary education.
[12] The time slices of instructive phases are significantly larger at the beginning of the course whereas they constantly decline during the process of the course. During the self-learning phases, the participants have to deal with written documents, create programs via PC and control the hardware components of existing automation systems.
[13] Director of studies Manfred Schauhuber, supervisor on automation engineering, vocational school of manufacturing engineering based in Munich.
[14] Here is recognized a latent tendency towards a shortened conversational behavior which is satisfied with curt replies. This is typical of the frontal phases of instruction.

REFERENCES

Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy for Learning, Teaching and Assessing. A Revision of Bloom´s Taxonomy of Educational Objectives*. New York: Addison Wesley Longman.

Arnold, R., & Gonon, P. (2006). *Einführung in die Berufspädagogik*. Opladen: Budrich.

Breuer, K., & Schmidt, J. U. (2010). *Neue Prüfung – neue Qualität? Evaluationsbericht zur Erprobung der vom Bundesministerium für Bildung und Forschung herausgegebenen „Umsetzungshilfen für die Abschlussprüfung der neuen industriellen und handwerklichen Elektroberufe“*. Berlin: Deutscher Industrie- und Handelskammertag.

Buchalik, U. (2009). Fachgespräche. Lehrer-Schüler-Kommunikation in komplexen Lehr-Lern-Umgebungen. In A. Schelten (Ed.) *Beiträge zur Arbeits-, Berufs- und Wirtschaftspädagogik, Bd. 26*. Frankfurt: Lang.

Buchalik, U., & Riedl, A. (2009). Fachgespräche zwischen Lehrenden und Lernenden im Unterricht ge-werblich-technischer Domänen. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 105*(2), 243–266.

Euler, D. (2011). Wirkungs- vs. Gestaltungsforschung – eine feindliche Koexistenz? *Zeitschrift für Berufs- und Wirtschaftspädagogik, 107*(4), 520–542.

Hattie, J. (2009). *Visible learning. A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.

Köller, O. (2012). What works best in school? Hatties Befunde zu Effekten von Schul- und Unterrichts-variablen auf Schulleistungen. *Psychologie in Erziehung und Unterricht, 59*, 72–78.

Liebelt, J. (2011). *Fachgespräche in der technischen beruflichen Bildung am Beispiel Automatisier-ungstechnik: Schulungskonzept und Potenzialanalyse*. Lehrstuhl für Pädagogik, TU München.

Nickolaus, R., & Pätzold, G. (2011). Lehr-Lernforschung in der gewerblich-technischen Berufsbildung. *Zeitschrift für Berufs- und Wirtschaftspädagogik (Beiheft 25)*. Stuttgart: Steiner.

Nickolaus, R., Riedl, A., & Schelten, A. (2005). Ergebnisse und Desiderata zur Lehr-Lernforschung in der gewerblich-technischen Berufsausbildung. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 101*(4), 507–532.

Plankl, G. (2011). *Fachgespräche in der technischen beruflichen Bildung am Beispiel Automatisier-ungstechnik: Schulungskonzept und Potenzialanalyse*. Lehrstuhl für Pädagogik, TU München.

Riedl, A. (2005). Lehr-Lern-Konzeptionen für berufliche Grundbildung und Fachbildung – Selbstlern-materialien und Lehrerunterstützung in konstruktivistischem Unterricht. Eine Projektskizze. In P. Gonon, F. Klauser, R. Huisinga, & R. Nickolaus (Eds.) *Kompetenz, Kognition und neue Konzepte der beruflichen Bildung*. Wiesbaden: VS Verlag, 253–265.

Riedl, A. (2010). *Grundlagen der Didaktik*. Stuttgart: Steiner.

Riedl, A. (2011). *Didaktik der beruflichen Bildung*. Stuttgart: Steiner.

Riedl, A., & Schelten, A. (2011). Das Münchner Forschungsprogramm zur Qualitätssicherung von Lehr-Lern-Prozessen in der gewerblich-technischen Berufsausbildung. In R. Nickolaus, & G. Pätzold (Eds.) Lehr-Lernforschung in der gewerblich-technischen Berufsbildung. *Zeitschrift für Berufs- und Wirtschaftspädagogik (Beiheft 25)*. Stuttgart: Steiner, 147–158.

Schelten, A. (2006). Fachgespräche. *Die berufsbildende Schule, 58*(5), 107–108.

Schelten, A. (2010). *Einführung in die Berufspädagogik*. Stuttgart: Steiner.
Schelten, A. (2011). Begründungswissen – eine Aufgabe der Berufsschule. *Die berufsbildende Schule, 63*(1), 3–4.
Schelten, A., Riedl, A., & Geiger, R. (2003). *Lehr-Lern-Prozesse in einer konstruktivistischen Lernumgebung für Steuerungstechnikunterricht. DFG-Abschlussbericht*. Lehrstuhl für Pädagogik, TU München.
Weinert, F. E. (2001). Schulleistungen – Leistungen der Schule oder der Schüler. In F. E. Weinert (Ed.). *Leistungsmessungen in Schulen*. Weinheim: Beltz., 73–86.

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H.-HUGO KREMER

SOCIAL MEDIA: POTENTIALS AND CHALLENGES FOR VOCATIONAL EDUCATION

SOCIAL MEDIA – A FIRST APPROACH

This paper focuses on media which can be subsumed under the notion of "Web 2.0" or "Social Media". These media can generally be characterized by three main aspects: (1) the disappearance of the separation between both local and central data and applications, as well as (2) the merging of the boundaries between producers and consumers of media content, and (3) the personalization of information through the combination of push and pull services (cf. also Kerres, 2006). Thus, in contrast to more traditional media like books, blackboards etc., Web 2.0 media may be characterized as follows:

- Media of the Web 2.0 generation are digital media which aim to address a wide audience and are available online.
- Media of the Web 2.0 generation are characterized by constant development of services.
- Media of the Web 2.0 generation provide the opportunity to create both a (virtual) self-presentation as well as an identity on the web.
- Media of the Web 2.0 generation enable the cooperation of actors by offering certain structures as well as linking people with common interests. This includes also the support of building communities.
- Media of the Web 2.0 generation are able to facilitate (individual and cooperative) information management.
- Media of the Web 2.0 generation offer participation possibilities; to some extent, the medium is developed by the contribution of the different actors. Accordingly, in general everybody should be able to participate (cf. also Pferdt & Kremer, 2010, p. 289).

It is interesting to note that these characterizations refer to potentials of the medium in terms of action rather than putting an emphasis on its hardware. Single services like blogs, wikis, social networks, tagging services etc. are not to be specified in this context. Accordingly, Web 2.0 technologies cannot be captured through single features. As long ago as 2007, the German expert commission "Education by the means of new media" stated that Web 2.0 technologies represent a new paradigm for

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 127–140.

the use of new media. In the commission's report, announcements on the following potentials are stressed: Web 2.0 opens up unimaginable possibilities ranging from interconnectedness, group formation, cooperative production of content, publicity production and attracting attention, administration and indexing of information and knowledge up to self-presentation (cf. Expertenkommission [Expert Commission], 2007, p. 3).

Web 2.0 applications are not limited to special applications for individual users but are widely used and appear to be a part of our environment. For that very reason, though, Web 2.0 applications are further characterized by the following: Technological opportunities such as the re-connection of information (mash up), available feedback and annotation possibilities for commenting, social tagging for indexing and opportunities to access and download film sequences, audio content or texts. They offer space accompanied by a participative media design and are not affected by a sender-receiver model. As a result, knowledge spaces arise which on the one hand can be designed in cooperation with other individuals and on the other hand offer a tool to show one's own individual personality and the relationships in social groups. Therefore, social media is shaped more by forms of usage than by the potentials of the internet-based applications. Schmidt describes these potentials as tools for management of information, identity and relationship (cf. Schmidt, 2006, p. 37; Pferdt, 2007, p. 148f.). Opposed to this, Web 2.0 and social media can be separated from each other as Web 2.0 is understood as the technological offer and social media in turn as the usage format of this offer which both cause and result in different behaviors. Thus, a personal aspect characterizes the "social" in the concept of social media.

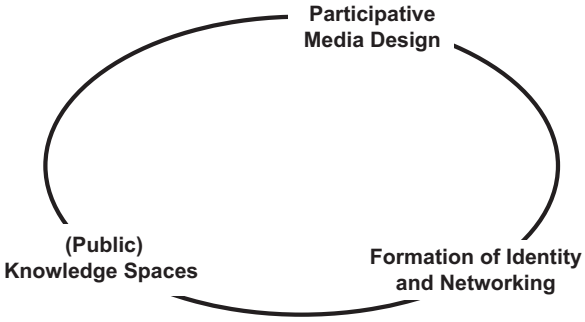

Figure 1. Characterization of Web 2.0 applications.

The potentials are attended by comprehending that there is an emergence of some kind of "participation-web" by the establishment of cooperative technologies. This is characterized, among other things, by turning the classic relationship between author and reader on its head. Accordingly, the reader becomes an author himself

and also adds certain parts of the text. Consequently, a significant improvement of internet use can be established. The usage data indicate clearly that there has been a wide expansion of the so-called Web 2.0 technologies as a result of internet access and new technologies (cf. van Eimeren & Frees, 2009). However, in the current debate it is still critically observed that in this form of dissemination one can hardly talk about a "participation-web" as few persons participate in the development of content. Busemann and Gscheidle (2009) stress the fact that only few persons feel obliged to fulfill the "participation" idea. Instead, a crowd of recipients is limited to the retrieval of information and sometimes even stands in opposition to the few "content-generating-actors". In accordance with this study, the following forms of behavior can be identified:

- Participation-web is applied only by a few people and is mainly characterized by passive use: The use of Wikipedia is focused on information retrieval as approximately 94% of all users just retrieve information.
- Content is primarily added by young users. Also, annotation and evaluation of existing content is hardly provided by a broad audience. Although the active participation in weblogs is definitely higher than in video communities or Wikipedia, most of the articles are made by persons who are under an age of 30.
- However, the participation in (private) communities is significantly higher than in other Web 2.0 services. In this way, there is both an increasing number of uses as well as an active design of articles.
- The use of professional networks hardly has a significant status.

With the exception of the participation in communities there is hardly any evidence that the Web 2.0 idea has extensively established itself. As already stated, the focus of many actors still lies on information retrieval. With regard to the communities, it would be interesting to specify whether the active design can be attributed to the generation of user profiles, as Busemann and Gscheidle (2009) suppose, or whether the product (namely the content) differs and should rather be classified as a sequence of entertainment. In addition, it is of equal interest whether the usage formats are transferred in further phases of life or whether they are simply typical for the phases of life of younger people (comparable with going out to the discotheque).

Altogether, the use of digital media is increasing. They have to be interpreted as an object of everyday life and play an important role within the field of socialization processes of young people. However, the active design of Web 2.0 cannot be found in all formats of Web 2.0 as it is limited to some specific fields. It can also be stated that the use varies between different age groups. Furthermore, classic distinctions such as information provision and information retrieval become blurred because both the selection and the composition of content not only represent an information retrieval but also include parts of information provision. Against this background, it can be pointed out that those articles with the aim of content production and provision are rather the responsibility of a small group.

H.-HUGO KREMER

SOCIAL MEDIA – A NEW MEDIA APPROACH FOR TEACHING AND LEARNING?

Social Media – From a Content-Oriented to a Process-Oriented Approach

Social media are established around many different and in parts rapidly changing services. Accordingly, there are lots of very different ways to use social media for teaching and learning processes. In schools the potentials of new media are definitely already recognized (cf. e.g. Bitkom, 2011). In contrast to the traditional eLearning discussion, a content-oriented approach which deals with the production and preparation of didactic material is – in the context of the social media discussion – complemented to an approach which deals with the idea of content production of the learners in the context of educational courses offered. From my point of view, the most visible and far-reaching potential lies within the media design in social contexts. The following usage formats can be distinguished:

Web 2.0 as an access to learning resources On the one hand, this is characterized by open access to a variety of resources in the internet and by (multimedia) learning resources (e.g. http://www.merlot.org/merlot/index.htm). But on the other hand, there is the possibility to combine learning resources and in this way access to learning and working formats is offered. For instance, the platform EfGP summarizes materials for English lessons for glaziers (cf. http://www.rheinfit.de/ GlassProfessionals.htm). The EfGP learning environment basically offers two program levels. On the first level, media-based interactive tools like the Glass Dictionary, an interactive vocabulary trainer, "Memory", hangman, competitions etc. are offered. These tools can be interpreted as "learning triggers", which allow media-based learning processes by their multimedia presentation. Media like forums, chats and video-conferencing are part of the program as well as wikis and weblogs. Both are used as learning and documentation tools. Moreover they enable the discussion of learning results respectively for the cooperative preparation of problems (cf. Merkenich, 2007). The second level offers the learners so called "Glass Lessons", which provides authentic as well as complex learning assignments within this context. The core elements of these lessons are so-called video-tasks which are designed after the didactic principle of "anchored instruction".[1] These video-tasks are generated from the learners' specific environment as a pilot project and represent authentic anchors, designed to encourage the learners. Moreover, it should offer the opportunity to recognize, define and solve problems independently, exploratively and creatively with the help of a situation that is as realistic as possible (cf. also Merkenich, 2007).

Individualized learning in social networks Web 2.0 is characterized, inter alia, by the relationship between individuals and groups. Indeed, Web 2.0 enables a one-to-one communication which takes place in a social network. Formats of cooperative learning are not necessarily associated with this type

of communication but an insight into individual ideas, experiences, actions, positions etc. is given and also opportunities for commenting and feedback. For instance, keeping an ePortfolio, weblogs etc. can contribute to documentation, transparency and feedback of learning experience. Gockel analyzes the potentials of using weblogs to support internships in the context of school-based learning processes (cf. Gockel, 2012; Kremer & Gockel, 2010). Nevertheless, these have to be distinguished from formats of cooperative learning which are also supported through Web 2.0 technologies. Coordinated learning formats are characterized by assignments which are edited by all learners, but distributed first and finally put together. In contrast, collaborative learning formats are characterized by a joint work on assignments. Web 2.0 offers the potentials to organize the learning group. For instance, Web 2.0 applications offer opportunities to assemble positions through a forum-discussion, to pursue a joint timeline, or to provide joint data resources (cf. differentiation for media-based cooperative learning; Kremer, 2007).

Social media design Social media design stresses the cooperative design aspect. Part of the learning process is the development of a media subject, e.g. in the form of a wiki, podcast or video. Hereby, the possibilities of Web 2.0 are used for cooperative media development and the structuring of the learning process. Normally, it is not sufficient to set a media development assignment and then rely on the learners' intrinsic motivation. Wikipedia is characterized by a few persons writing a lot and a majority who only makes small changes or are just reading. As a result, the transfer to learning processes is connected with different problems, as for instance the question whether everybody should make a contribution, how far the quality of contributions is important, or how "writing much" is evaluated. Social media design as part of vocational training courses demands questions like these to be incorporated and thus differences in the reference concept of Wikipedia become visible. The development of the "Glass Compendium" could not be achieved by a simple implementation of the wiki-technology. As a central element, a complex concept for quality assurance has been developed which controls the workflows between different groups of students. The responsibility for the quality of the wiki articles is taken by an editorial staff of students. The tasks of this staff are the evaluation of the existing articles in print form, consulting the authors regarding article quality, the releasing of articles, and the publication within different platforms. In turn, the editorial staff of students experiences a consulting advice by the other groups of students. This merely suggests the fact that the wiki technology cannot be transferred easily because vast measures for a didactic use are required (cf. also Kremer, 2008).

In addition to the discussion around Web 2.0, not only are new media in the focus but also new media offers are established to support the exchanges of persons in social

contexts and open individual scopes of action. Accordingly, it is not a matter of setting Web 2.0 formats as the central attraction but to enable the opening of individual learning processes in social contexts. From the learners' point of view, media are part of their learning environment and offer a reception frame for their individual competence development. Lastly, the importance of media is not produced by teachers in the sense of media developers, but through the learners themselves as users of media. The media developer can enable an actualization, but cannot produce it. Therefore, it is important to set the learning actions in the center and then to look at the roles of media in the learning process (cf. Aebli, 1980, pp. 87ff.; Czycholl, 1993, p. 63; Stratenwerth, 1998). A central element of the media development is not the development of a medium but the reference of media to the learning process (cf. Dilger, 2007, pp. 38ff.), then the media development becomes an actual learning process. Media development requires a strict distinction between learning actions and teaching actions. Only in this case, is a productive dealing with the learning environment possible.

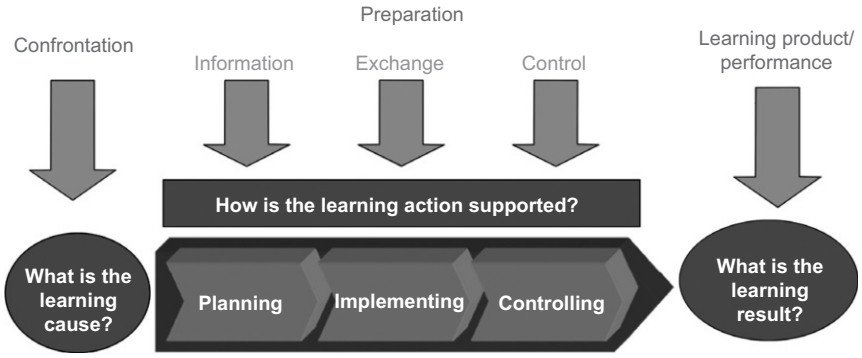

Figure 2. Media as development tools.

The term "development tools" indicates that media have to be understood in terms of tools which support competence development (cf. Ertl & Sloane, 2005). Although this idea is not new, this focus cannot often be found. Therefore, media can have a confrontation function, serve as carrier of images, and support the process of preparation. As confrontation media, priority is given to the question how far media can lead to a learning cause. As a preparation medium, it analyzes how the learning process can be supported. Finally, as learning product, it focuses on how the process of media development could be given priority. The media development of the learners is necessary to produce a learning result.

In conclusion, it can be stated that with the present media understanding

- the perspective of learners comes into focus,
- media are used to help individual development processes,

- the development and active dealing with the learning environment should be stimulated and
- media experience a shift from teaching media to learning media.

Criticism of New Media in Educational Institutions

In the following quotation, Spitzer exemplarily expresses critical aspects of new media use in educational institutions:

> There are a lot of blackboards in mathematical institutions of German universities. In mathematics, you "think" with chalk and board or with pencil and paper. This is much faster, has a haptic component, is easy to handle, does not need any electricity and therefore the investment costs are kept within reasonable limits, apart from costs for maintenance. If boards are the best tools at places where thinking in its clearest and most complex form is taught, aren't they the best tools in schools, too? Those who claim the opposite and spend millions of public funds, have the burden of proof that the innovation is better than everything which already exists. (Spitzer, 2010, p. 9).

This quotation implies a very pointed position that cuts down the media question on a didactic level only to the development of mathematical thinking. This statement should not be questioned for the whole education sector. But it remains open whether the relevance of new media can be considered only as traditional aims having regard to viewpoints of imparting. Similarly, Robinson points out that knowledge and information societies require different educational emphases than an industrial society when looking critically at the standardized structure of the curriculum: "The curricula of most school systems seem to divide into two broad groups: the useful disciplines and the useless ones. Languages, mathematics, science and technology are useful; history, standards, arts programs are usually cut" (Robinson, 2011, p. 61). At least, from the point of view of a vocational school it will be a question whether mathematical competence is independent from its context of use and whether this context could even offer the possibility to acquire mathematical knowledge and skills. Without adding subject-related or vocational-didactic questions for the acquisition of mathematical competences as part of vocational action competence at this point, it has to be noticed that implications which are connected to the use of new media are more or less hidden. Due to this background, studies on the effectiveness of new media in comparison to board and chalk should be taken into account with regard to the shifts of competences to be acquired.

The discussion about social media clearly shows that it is not only a question of conveying but also the educational institutions themselves are on trial and the educational mandate has to be questioned. In concrete terms, this means to take up a discourse about the challenges faced by educational institutions in the age of Web 2.0

and how to meet these challenges. The basic challenge does not lie in focusing on the handling and using of media, but rather it lies in the fact that through social media the dealing with information and knowledge gains importance and, therefore, learning actions are transported into everyday life of society. In this regard, it should be questioned specifically whether learning in school could prepare for learning through social media and whether future learning resources can be discovered. Furthermore, there are challenges for educational institutions in the classical meaning, which can be assigned to the category of media competence. For instance, it becomes increasingly necessary to follow one's own presentation in the internet and to recognize the consequences of one's own actions for this presentation. In 2007, the expert commission had already taken the following position concerning the challenges of Web 2.0 for educational work:

> The current development is driven by the universal access to the internet. This is based on broadband network access and cheap and efficient mobile terminal equipment. In addition, there are simple applications which allow the production and provision of content by anyone for anyone. This leads to obvious changes of user habits as they become more visible on the younger generation that already grows up with the internet. The quantity of available content and potential business, cooperation and communication partners explodes. The managing of this variety has to be learned, just like the dealing with money and consumer behavior in an excessive world of material goods. The ability to move the world in a designated way like the assets of companies and institutions, to achieve competitive advantage through the usage of the potentials, requires a close cooperation of competence development, knowledge acquisition and working processes. In this sense, Web 2.0 is an impulse and challenge as well as a solution approach to enable new forms of distributed knowledge organization and –acquisition (Expert commission, 2007, pp. 4f.).

The discussion about social media has to be held in connection with an education-theoretical debate about educational mission, assignments, position of educational institutions and can only be discussed very limited as methodical debate.

Social Media Design and Complex Learning Environment

Social media design assimilates especially the design aspects of cooperative technologies. Thus, the potentials of social media shown are included but no completely new didactic concept is introduced. The design of medial artifacts has already been implemented with other media, for instance within the framework of the development of broadcasting reports, journal articles, or video productions. Web 2.0 applications offer the potential to integrate cooperative design processes in everyday school-based teaching and learning arrangements.

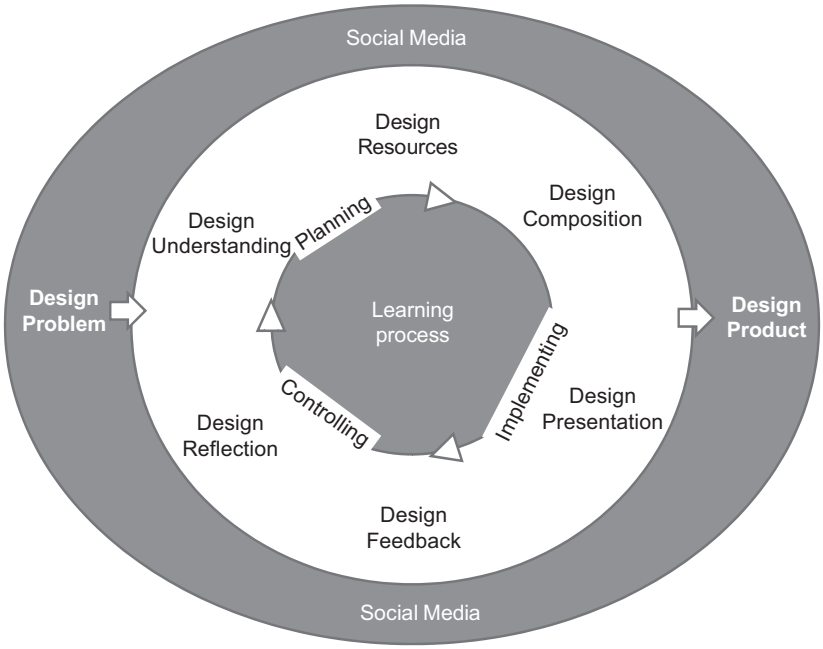

Figure 3. Social media design.

Following a draft of design-oriented didactic, the design steps can be differentiated as follows (cf. Kafai & Resnick, 1996; Pferdt & Kremer, 2010; Pferdt, 2012; Schön, 1987): The starting point is the confrontation with a design problem which requires the development of a design product. The type of problem should be authentic in view of the professional working environment and should require cooperative handling. In a first step, both an understanding of the design problem has to be established and further information has to be collected. On this basis, design resources for handling the problem have to be used or provided for the design action in a second step. Within the framework of the design composition, a first draft has to be prepared. Thus, planning and preparatory work are brought together in this step. A design presentation will enable a first discussion on the artifact and therefore establish a basis for response and feedback. Within the framework of design reflection, the feedback is captured, other opportunities are determined, and the final result of one's own design production is embedded. There are clear points of reference to the discussion about complex teaching and learning arrangements. Design-oriented didactic also follows a (complete) learning action. The cooperative design process is used as framework to open up a learning process. In this framework, like in complex teaching and learning arrangements, particular emphasis is put on learning tasks.

Ultimately, the anchor is set to what extent it succeeds in promoting professional action competence via the cooperative media development process.

Altogether, there is a demand to integrate the media development process in professional action situations, thus it serves for dealing with these situations. Therefore, social software and its various forms of usage can only be considered as independent action processes to a limited extent, but should rather be integrated in vocational action contexts which then require the development and use of a "Glass Compendium" (cf. Pferdt & Kremer, 2010, p. 304).

WEB 2.0 AS CHALLENGE FOR EDUCATIONAL INSTITUTIONS

Social media cannot be established in educational institutions without consequences. Indeed, it has repercussions on educational work on different levels. For instance, there is the delineation between educational organizations and the public. Educational organizations can largely be characterized as delimited organizations. Normally, the boundaries of educational institutions can be clearly identified but transitions to other areas of live or areas of development are not fluent or anchored in the everyday life of vocational school offerings. Social media is characterized by the establishment of connections between actors, organizations and fields, or by the opening of access to information and knowledge resources through visible network structures. This can certainly be classified as essential and is, however, accompanied by basic questions for the use of social media in educational institutions. For instance, the idea behind learning platforms was the provision of content, tasks, and further learning resources in separate fields arranged by teachers. Concepts of Web 2.0 give learners the opportunity to compile their learning and working environment on their own. This way, they are not related to a delimited field. For instance, it can become possible to get access to both other learners and ways of exchanging in order to take in learning resources that are appropriate to respective problems. Thereby, instead of providing the content for learning, a structure is created that establishes a self-creation and integration of the content.

The above hints show that the implementation of social media in teaching and learning contexts is associated with serious challenges. Therefore, they have to be integrated in the development work of vocational schools with regard to the curricular, personal and organizational level. As part of a vocational school's explorative analysis, the following asymmetries could be identified:

Asymmetry I: Acceptance of the potential versus limited necessity of use New media are considered as offering potential for the didactic work of teachers. In this context, topics/aspects such as increasing motivation, relief and simplification of everyday school life or access to resources are pointed out. Nevertheless, only a limited necessity is seen to integrate new media into one's own didactic work. This could indicate a partial use while the teaching and learning culture is maintained.

Asymmetry II: Differences in use between teachers and learners Teachers as well as learners of vocational schools point out that new media are used (daily). However, there are significant differences between teachers and students with regard to the use of new media. The access to social networks plays a very important role for juveniles whereas it is of little importance for the teachers. In this context, it is quite comprehensible that media competence is classified as crucial and that there is a need for development, not only for the learners. Rather, development of the teachers' media competence becomes necessary.

Asymmetry III: Relief and burden New media are characterized both as an aid for one's own job from the simplified access to information and also as burden due to a permanent availability, dealing with inaccuracies in the studying of knowledge because of the simply accessible resources and integration abilities.

These aspects suggest that the implementation of social media cannot be realized merely through the provision of corresponding technological prerequisites but has to be systematically implemented in educational organizations. Moreover, for school-based educational institutions it is not a matter of the individual teacher's level but a common task in the educational organization. The following questions only indicate the complexity for educational institutions in selected relevant fields:

1. Focus I: Provision of technology / infrastructure
   Which social software, blog provider etc. shall be chosen?
   Can / may data of students be stored on servers outside the school?
   Which tasks can be performed by a school learning platform in the age of social media?
   How can decentralized access to new media be made available?
2. Focus II: Competences of teachers and learners
   Which competences do teachers need for the didactic use of social software?
   How can teachers be introduced to social software?
   How can the development of media competence be anchored through the different teaching and learning arrangements?
3. Teaching and learning action
   How can an environment be created that provides a discussion with new media?
   How can the willingness to provide materials and documents to colleagues, learners etc. be fostered?
   Which measures for publishing learning actions are justified? When are learning actions perturbed by the public?

PROSPECT: WEB 2.0 AND REFORM OF VOCATIONAL EDUCATION

Currently, there is an obvious risk that the new media presently used in schools will disappear someday. In recent years, the initial eLearning euphoria has turned into a significant disillusion. In the beginning, eLearning was accompanied by the idea of

technological feasibility, which has not come true in this form. Based on didactic problems, the idea could not be realized with regard to economic and information-technological aspects. As a result, it is necessary to turn the discussion about eLearning by putting emphasis on didactic questions. Nevertheless, the necessity of information-technological changes shall not be negated. These changes do not lead to didactic and methodological changes. They require a fundamental change of both the didactic design and not only the technology (cf. Mandl, Gruber & Renkl, 1997, and others).

Even if a lot of successful pilot projects and conceptions of instructional design of media concepts already exist, in retrospect it is sobering that no extensive changes in teaching and learning have taken place through the previous technological developments. In this context, it can be stated that even the "old new" media (e. g. language laboratory, television) were at least not very successful with regard to the widespread innovative didactic concepts of everyday life and therefore did not contribute to a relief of didactic comprehension.[2] The use of new media in vocational education also seems to be restricted to "higher-value" courses as there is little scope for eLearning projects in low-threshold educational opportunities (cf. Kremer & Zoyke, 2008). This could be due to the fact that the didactic processing of the learning environment is more challenging when new media are included. But even if technological changes are currently obvious in vocational education, a replacement of "old" didactics can hardly be anticipated. Although improved technological equipment is noted on the one hand, a widespread change of the methodological design of teaching and learning is only very limited on the other (cf. Kremer & Zoyke, 2008; Herzig, Grafe (n.d.) & Tenberg, 2006; Klusmeyer, Lang & Pätzold, 2004).

NOTES

[1] Cf. the study of Bransford et al. (1990), who characterized the anchored-instruction approach.

[2] Seufert and Euler state in their paper "Sustainability of eLearning – innovations in higher education" as follows: "So far, there are 'Early-Adopters', the innovators, who stand for eLearning because of personal commitment to the cause. The question is how eLearning can be integrated in central processes of teaching so that quite ordinary teachers will use it every day?" (Cf. Seufert & Euler, 2003, p. 4). Here, the interesting question is what is understood by "quite ordinary teachers".

REFERENCES

Aebli, H. (1980). *Kognitive Aspekte der Handlungstheorie*. Stuttgart: Klett-Cotta.

Bitkom (2011). *Schule 2.0. Eine repräsentative Untersuchung zum Einsatz elektronischer Medien an Schulen aus Lehrersicht*. Berlin 2011. Retrieved 10.03.2011 from http://www.bitkom.org/files/documents/BITKOM_Publikation_Schule_2.0.pdf.

Bransford, J. D. et al. (1990). Anchored instruction: Why we need it and how technology can help. In D. Nix, & R. Sprio (Eds.) *Cognition, education and multimedia*. Hillsdale: Erlbaum Associates.

Busemann, K., & Gscheidle, C. (2009). Web 2.0: Communitys bei jungen Nutzern beliebt. ARD-ZDF Online Studie 2009. *Media Perspektiven, 7*/2009, 356–364. Retrieved 16.07.2010 from http://www.ard.de/intern/basisdaten/-/id=1183518/property=download/nid=8192/1gi7txj/index.pdf.

Czycholl, R. (1993). Zum Stellenwert handlungsorientierter Lehr-/Lernmethoden in der beruflichen Bildung vor dem Hintergrund einer nichtdualistischen Berufsbildungstheorie. In W. Schneider (Ed.)

Komplexe Methoden im betriebswirtschaftlichen Unterricht. Festschrift für Hans Krasensky zum 90. Geburtstag. Wien: MANZ'sche, 63–81.

Dilger, B. (2007). *Der selbstreflektierende Lerner – Eine wirtschaftspädagogische Rekonstruktion zum Konstrukt der Selbstreflexion*. Paderborn: Eusl.

Eimeren van, B., & Frees, B. (2009). Der Internuter 2009: multimedial und total vernetzt? ARD-ZDF Online Studie 2009. *Media Perspektiven, 7*/2009, 334–347. Retrieved 16.07.2010 from http://www.ard.de/intern/basisdaten/-/id=1183514/property=download/nid=8192/1eklujf/index.pdf.

Ertl, H., & Sloane, P. F. E. (2005). Einführende und zusammenführende Bemerkungen: Der Kompetenzbegriff in internationaler Perspektive. In H. Ertl, & P. F. E. Sloane (Eds.) *Kompetenzerwerb und Kompetenzbegriff in der Berufsbildung in internationaler Perspektive*. Paderborn: Eusl, 19–42.

Expertenkommission Bildung mit neuen Medien (2007). *Web 2.0: Strategievorschläge zur Stärkung von Bildung und Innovation in Deutschland*. Bericht der Expertenkommission Bildung mit neuen Medien. Retrieved 22.06.2010 from http://www.bmbf.de/pub/expertenkommission_web20.pdf.

Gockel, C. (2012). Das Blended Mentoring Concept: Ein webbasierter schulischer Betreuungsansatz im Rahmen des Schülerbetriebspraktikums. Unveröffentlichtes Manuskript, Paderborn 2012. In M. Beutner, H.-H. Kremer, & A. Zoyke (Eds.) *Individuelle Förderung in der berufsschulischen Ausbildungsvorbereitung* (Arbeitstitel). Paderborn: Eusl.

Herzig, B., & Grafe, S. (n. d.). *Digitale Medien in der Schule. Standortbestimmungen und Handlungsempfehlungen für die Zukunft. Studie zur Nutzung digitaler Medien in allgemein bildenden Schulen in Deutschland*. Retrieved 04.10.2012 from https://www.uni-paderborn.de/fileadmin/kw/Institute/Erziehungswissenschaft/mepaed/downloads/forschung/Studie_Digitale_Medien.pdf.

Kafai, Y., & Resnick, M. (Eds.) (1996). *Constructivism in Practice: Designing, Thinking, and Learning in a Digital World*. Mahwah, Lawrence Erlbaum Associates.

Kerres, M. (2006). Potenziale von Web 2.0 nutzen. In A. Hohenstein, & K. Wilbers (Eds.) *Handbuch E-Learning*. München: Fachverlang Deutscher Wirtschaftsdienst.

Klusmeyer, J., Lang, M., Pätzold, G., et al. (2004). Das Methodenrepertoire von Lehrern und Ausbildern in der beruflichen Bildung. *Berufsbildung, Heft 85*, 2004, 33–34.

Kremer, H.-H. (2007). Lernen in medienbasierten kooperativen Lernumgebungen: Modellversuch KooL. In H.-H. Kremer, & P. F. E. Sloane (Eds.) *Paderborner Forschungs- und Entwicklungswerkstatt. Forschungsfragen und -konzepte der beruflichen Bildung*. Paderborn: Eusl, 35–46.

Kremer, H.-H. (2008). Medien als Entwicklungswerkzeuge in selbstgesteuerten Lernprozessen. In K. Büchter, & T. Tramm. *bwp@ Ausgabe 13, Selbstorganisiertes Lernen in der beruflichen Bildung*, Ausgabe 2007, 1. Ergänzung Januar 2008, Retrieved 04.10.2011 from http://www.bwpat.de/ausgabe13/kremer_bwpat13.pdf.

Kremer, H-H., & Gockel, C. (2010). Schülerbetriebspraktikum im Übergangssystem – Relevanz, Potenziale und Gestaltungsanforderungen. *bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 17*, 1–20. Retrieved 26.04.2010 from www.bwpat.de/ausgabe17/kremer_gockel_bwpat17.pdf.

Kremer, H.-H., & Zoyke, A. (2008). Implementation von eLearning an Berufskollegs – eine Studie zu Stand und Entwicklungsperspektiven in Ostwestfalen-Lippe. In A. Eder (Eds.) WS 13 Unterrichtsqualität und digitale Medien. *bwp@ Spezial Nr. 4 – Hochschultage Berufliche Bildung*, 2008. Retrieved 22.06.2010 from http://www.bwpat.de/ht2008/ws13/kremer_zoyke_ws13-ht2008_spezial4.shtml.

Mandl, H., Gruber, H. H., & Renkl, A. (1997). Situiertes Lernen in multimedialen Lernumgebungen. In L. J. Issing, & P. Klimsa (Eds.) *Information und Lernen mit Multimedia*. 2. Auflage. Weinheim: Beltz, 167–178.

Merkenich, S. (2007). Kooperative Wissensnetzwerke in der beruflichen Erstausbildung: Ein, Glaskompendium als Wiki-Projekt. Gemeinsam mit Ulrike Wagener. In H.-H. Kremer (Ed.) *Lernen in medienbasierten Lernumgebungen - Modellversuch KooL*. Paderborn: Eusl, 51–69.

Pferdt, F. G. (2007). Wird Lernen sozial oder wird sozial gelernt? Lernprozesse mit Social Media gestalten. In H.-H. Kremer (Ed.) *Lernen in medienbasierten kooperativen Lernumgebungen – Modellversuch KooL*. Paderborn: Eusl, 140–168.

Pferdt, F. G. (2012). *Designbasierte Didaktik (DBD) – Lernumgebungen mit Social Media innovativ gestalten*. Paderborn: Eusl.

Pferdt, F. G., & Kremer, H.-H. (2010). Berufliches Lernen mit Web 2.0 – Medienkompetenz und berufliche Handlungskompetenz im Duell. In B. Herzig, D. M. Meister, H. Moser, & Niesyto (Eds.) *Jahrbuch Medienpädagogik 8 -Medienkompetenz und Web 2.0.* Wiesbaden: VS Verlag, 289–309.

Robinson, K. (2011). *Out of our Minds. Learning to be Creative*. Chichester: Capstone.

Schmidt, J. (2006). Social Media: Onlinegestütztes Informations-, Identitäts- und Beziehungsmanagement. *Forschungsjournal Neue Soziale Bewegungen, 2*/2006, 37–46.

Schön, D. A. (1987). *Educating the reflective practitioner: towards a new design for teaching and learning in the profession*. San Francisco: John Wiley & Sons.

Seufert S., & Euler, D. (2003). *Nachhaltigkeit von eLearning-Innovationen*. Swiss Centre for Innovations in Learning, SCIL-Arbeitsbericht 1. Juni 2003. Retrieved 04.10.2012 from http://www.scil.ch/fileadmin/Container/Leistungen/Veroeffentlichungen/2003–06-seufert-euler-nachhaltigkeit-elearning.pdf.

Spitzer, M. (2010). *Medizin für die Bildung. Ein Weg aus der Krise.* Heidelberg: Spektrum.

Stratenwerth, W. (1988). Handlung und System in Modellen der Wirtschaftspädagogik und Wirtschaftsdidaktik - dargestellt am Beispiel eines Strukturmodells der Lernsituation. In M. Twardy (Ed.). *Handlung und System*. Düsseldorf: Verlagsanstalt Handwerk, 123–140.

Tenberg, R. (2006). *Didaktik Lernfeldstrukturierten Unterrichtes – Theorie und Praxis beruflichen Lernens und Lehrens*. Hamburg, Bad Heilbronn. 5–9, 63–123, 303–307.

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THE INFERENTIAL CONSTRUCTION OF KNOWLEDGE IN THE DOMAIN OF BUSINESS AND ECONOMICS

INTRODUCTION

It is almost a truism, today, that knowledge is not just "picked up" from the world, but rather knowledge is *actively constructed*. Yet the precise meaning and functioning of "active construction" is anything but clear. Although it is generally agreed that the process of knowledge construction is fueled by perturbation of knowledge structures, there does not appear to be much firm ground in this respect (apart from Piaget's theory of equilibration and structural development and the conceptual change literature based on it) (see e.g. Hasselhorn & Gold, 2009; Ormrod, 2010). On the whole, our knowledge of knowledge construction does not seem to have gone far beyond tentative ideas and metaphors and the rather fruitless debate about various strands and brands of constructivism (for the field of vocational education, see also Pridham, O'Mallon & Prain, in press). What we clearly do not know is how the individual acquires new knowledge on the basis of previous knowledge and ongoing experience, and especially how knowledge is separated from mere belief.

This is not to say that there have not been advances. In particular, we know today that the acquisition of knowledge is domain specific and situated in contexts that have not only a cognitive but also an emotional and conative significance. Still, and perhaps even more so, this requires us to explain how the cognitive processes taking place in this broader framework actually take place. It is all the more important as we believe that new knowledge is constructed in a domain-specific way, which means that its acquisition must be based on certain features of particular subject matters and how they are perceived by learners (see e.g. Smith, 2007).

Although the issue of knowledge construction is obviously a difficult and tricky one, the main contention of the present paper is quite simple and straightforward: Starting from the premise that new knowledge is constructed from prior knowledge, and provided that the notion of knowledge implies conviction on the part of the learner and (a sufficient degree of) certainty, new knowledge must somehow be *inferred* from prior knowledge. That is, if it had not been inferred, it would not be distinguishable from mere imagination or even illusion. What's more, this not only concerns the question of what we ultimately and eventually accept as knowledge,

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 141–156.

but also of what we initially conceive as fruitful ideas and choose for further investigation, for we do not consider each and every idea or just any possible hypothesis, however preposterous and unlikely it seems to be. The process of generating and selecting new ideas therefore seems to bear an inferential aspect as well.

If the argument is correct as far as it goes, the question of knowledge construction essentially translates into an inferential problem. With respect to this focal point we have witnessed a growing interest among both philosophers and psychologists in concepts like "abduction" or "inference to the best explanation" (see e.g. Bartelborth, 1996; 1999; Boyd, 1990; Josephson, 1994; 2000; Lipton, 1991; Magnani, 2009; Meyer, 2009; Schurz, 2008; Thagard, 1996). Admittedly, the literature contains quite a puzzling range of different ways of understanding these notions and their roles in a wider epistemological context, but we need not be concerned with this problem here (see Minnameier, 2004; 2005a; Paavola, 2006, for a detailed analysis). The present paper focuses on an inferential epistemology that is fairly narrowly based on the approach of Charles S. Peirce, who originally introduced the notion of "abduction" (see Minnameier, 2004; 2005a; 2010a; 2010b; 2011, for detailed analyses and an overview of this epistemology in the context of current philosophical debates).

It has become all the more apparent in recent years that Peirce's philosophy is quite up to date and worth considering. However, as already mentioned above, the reception of his ideas is all but homogeneous. This might be due to the fact that Peirce himself had substantially reworked his approach towards the end of the nineteenth century, so that the concepts received quite different meanings in the later version. In the first part of the paper I will present a reconstruction of abduction, deduction, and induction as well as their interaction which I believe is in line with the view of the mature Peirce (although my chief concern is a systematic, not a historical one).

The second part of the paper is devoted to an exemplary exploration of the theory's usefulness in the reconstruction and planning of teaching and learning processes in vocational education and training. It is shown that the theory allows us to trace all the important steps in processes of knowledge acquisition and conceptual change.

AN INFERENTIAL THEORY OF KNOWLEDGE ACQUISITION

Progression into the Past: From Popper to Peirce

Before addressing Peirce's account it may be instructive to remind ourselves of Popper's logic of (scientific) discovery, not least because the latter still appears to reflect the common epistemological point of view among most psychologists and educational researchers (despite the debate on constructivism). Popper – like many others of his time – relegated the problem of discovery to psychology (see Popper, 1959, pp. 30–32), claiming that "there is no such thing as a logical method of having new ideas" (ibid., p. 32). He believes it is a matter of "creative intuition" in the Bergsonian sense (ibid.). Similarly Hempel, referring to Whewell's "happy guesses", tells us that "(s)cientific hypotheses and theories are not *derived* from

observed facts" (1966, p. 15). And if this is the case for scientific theories, it will certainly also be the case for the individual's personal knowledge.

Popper was equally skeptical with respect to the confirmation of hypotheses, hence his notion of corroboration. He rejected inductive logic as a means of confirmation and wanted to stay "entirely within the scope of *deductive logic*" (1971, p. 178). However, his falsificationist approach has proved to be untenable, not only because it is too weak, but mainly on the grounds of the so-called Quine-Duhem thesis which states that theories cannot be falsified in principle (for any negative empirical result can always be attributed to the influence of side-conditions). Thus, there appears to be more to both accepting and rejecting a theory than merely deduction.

If we take these two criticisms together, we may say that Popper's deductive approach leaves us with two open flanks, one regarding the generation of new ideas and the other with respect to confirmation. Both are crucial for knowledge, because the former concerns the creative expansion of our body of knowledge, the latter relates to what we accept on good grounds, hence *know*, and what we are justified to reject, hence *know* to be false.

The latter has perhaps been even more neglected than the former, because knowledge has for a long time been taken as a synonym for information that is taken in or at best understood. However, a student may well understand what the teacher wants to get across and still have doubts as to its truth, its practical relevance or situation-specific usefulness. Knowledge in a deeper sense implies conviction and certainty on the part of the knower. Peirce, to whom we will turn in the following section, has set forth an epistemology and philosophy of science that avoids the open flanks and covers the complete process of knowledge acquisition with a system of three distinct types of inferences; abduction, deduction and induction. Let us now explore this approach.

Peirce's Trivium of Abduction, Deduction and Induction

One of Peirce's most important insights was that induction does not lead to new ideas. Educational scientists and psychologists today are still wedded to the idea that induction is the mode leading to new knowledge, whilst deduction draws the necessary consequences from this knowledge. As for induction this is clearly wrong. Induction is nothing more than the extrapolation of existing knowledge from a known domain into an unknown domain of the same type, i.e. from past experience to future experience or from a sample to the respective whole: "It has been raining for a couple of days, so it is going to rain tomorrow, too." or "Unemployment has risen every winter so far, so it will certainly rise next time, as well." These are simple examples of induction, by which information is carried on to as yet inexperienced areas or the untested parts of a generalized hypothesis.

What's more, even such simple (enumerative) inductions are not carried out arbitrarily. They have to be preceded by some kind of rational judgement, since

otherwise one could come up with all sorts of nonsense hypotheses, like for instance the following one: "You were reading this paper five minutes ago, you were also reading it two minutes ago, you are actually reading it just now, hence – by induction – you will be reading it for the rest of your life." This conclusion is not necessarily false, but most probably and hopefully it is. Thus, induction is based on some prior theoretical reflection and selection process.

What we also learn from this is that induction "never can originate any idea whatever. Nor can deduction. All the ideas of science come to it by the way of Abduction." (CP 5.145[1903]).That is to say that induction cannot be the inference that leads to novel suggestions or hypotheses, let alone major conceptual changes in the Piagetian sense. This is the proper realm of another type of inference, i.e. abduction. According to Peirce, the generation of new ideas is a logical process, but one that is neither deduction nor induction. And the conjoint functioning of all three types of inference is perhaps most incisively expressed in this passage:

> Abduction is the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea; for induction does nothing but determine a value, and deduction merely evolves the necessary consequences of a pure hypothesis.

Deduction proves that something *must* be; induction shows that something *actually is* operative; abduction merely suggests that something *may be*.

Its only justification is that from its suggestion deduction can draw a prediction which can be tested by induction, and that, if we are ever to learn anything or to understand phenomena at all, it must be by abduction that this is to be brought about (CP 5.171[1903]).

Abduction, according to Peirce, yields new insights, but often highly speculative and fallible ones. The role of deductive inferences is to derive the consequences of what is assumed in a certain theory. However, those consequences are logically necessary only on the level of the language in which they are stated. Apart from this, their ontological validity depends entirely on the truth of the premises from which they are derived. Testing whether the assumptions and deduced consequences really obtain is therefore an additional requirement, which is the task of induction. "Induction consists in starting from a theory, deducing from it predictions of phenomena, and observing those phenomena in order to see how nearly they agree with the theory" (CP 5.170[1903]).

Induction ultimately leads to a positive or negative judgement on whether the theory in question is to be regarded as confirmed (so far) or refuted, or whether it needs to be modified and re-examined (see CP 2.759[1905]). Thus, induction does not – not even ideally – entail an ultimate and definitive judgement, but rather results in forming habits or warranted expectations that are permanently evaluated and reconfirmed – or challenged – as the theory is used in ordinary practice (see e.g. Hookway, 1997, p. 152). In this way, i.e. when the result is negative, induction also brings about the surprising facts that function as input and driving force for novel

abductions. This is the heart of Peirce's pragmatism and it also reveals the dynamic and recursive connection of all three inferences, which is illustrated in Figure 1.

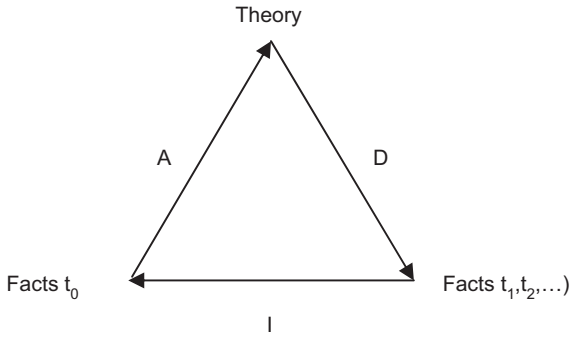

Figure 1. The dynamic interaction of abduction, deduction, and induction.

In what sense are the three inferences "logical"?

This is not the place for a particularly philosophical discussion of Peirce's theory, but a few words on the "logic" of the three inferences may nonetheless be appropriate (for a more profound analysis see Minnameier, 2004, pp. 86–90). Today, the term "logic" is normally used synonymously with "deductive logic". This notion is obviously too restricted in the present context where two more types of inference have to fit in the category. Therefore, I take logic in the older and broader sense of the study of rules of correct reasoning. In this perspective, the logicity of an inference depends on whether it is rationally warranted, or in other words, whether the transition from a set of premises to a conclusion is justified in some way or other (see also da Costa & French, 1989, p. 341).

Thus, we may ask ourselves what it takes for the three inferences to be valid, respectively. Starting with abduction, let us consider the rationale that Peirce describes in his *Lectures on Pragmatism*:

1. The surprising fact, *C*, is observed;
2. If A were true, *C* would be a matter of course.
   Hence,
3. There is reason to suspect that A is true. (CP 5.189[1903]).

C stands for "case" and *A* for any "hypothesis" (probably marked "A" as "assertion"). In the following I replace *A* with *H,* just for convenience. The task of abduction, according to this characterization, is to explain the facts. So the essential step is to develop a coherent account of the established facts, and the above syllogism expresses a rational judgement precisely in this respect. An abduction, accordingly, is valid if and only if it accommodates the explanation-seeking facts in

a coherent account. It may not be the only possible explanation or the only way to address a certain question, and it may be ultimately rejected for one reason or another, but the task of abduction is merely to provide a possible and suitable account.

As is well known, deduction reveals statements already implicit in the premises. Thus a deductive argument is valid if it can be shown that the conclusion is a *necessary* consequence of the premises. However, it never tells us whether those premises are in fact true. Hence, abduction and deduction alone do not suffice to establish new knowledge (unless it can be shown to be deductively entailed by other established truths). Deduction only explores the consistency of a hypothesis and relates it to relevant background knowledge. This is what a deductive syllogism looks like:

1. H is true.
2. Additional premises P1, P2, …, Pn are true.
   Hence,
3. Statements S1, S2, …, Sn are true (by entailment).

Provided the hypothesis passes this deductive test, it will have to be subjected to empirical testing, and this ultimately leads to an inductive judgement as to the truth or falsehood of the hypothesis. An inductive inference essentially consists in satisfying the mind that a certain theory is true or that a certain solution to a problem is appropriate (not all problems are on truth and falsehood, because theories may also be used in a technological interpretation). What is needed is empirical evidence that can function as a decisive indicator, so that one cannot but either accept or reject a certain suggestion. This is expressed in the following syllogism:

1. If H were true, evidence E would have to be observed (under certain side conditions).
2. E is observed, and any conceivable alternative hypothesis H' is to be rejected.
   Hence,
3. There is reason to believe that H is true.

Knowledge of truths (and falsehoods) implies certainty, and certainty does not come in degrees of probability. It involves a qualitative statement, unless the matter is to remain unresolved. The validity of such a judgement also depends on whether alternative interpretations – including the "zero-hypothesis" – can be excluded. Such an approach to theory evaluation, in a way, turns Popper upside down, as John Earman has pointed out in his plea for an elaborated version of eliminative induction:

> Popper's account of scientific methodology emphasizes the corroboration of a hypothesis as arising from unsuccessful attempts at falsification of the hypothesis, but for the eliminativist it is successful attempts at falsifying competing hypotheses that count, and the success of inductivism piggybacks on this eliminative success (Earman, 1992, p. 163).

However, we cannot test those hypotheses that are as yet to be advanced, those that will be suggested in the future. Therefore, induction can never be definitive or absolute. This reservation does not affect the Peircean notion of induction (nor that of truth), however, it only emphasizes the underlying pragmatism and the need for continual re-evaluation (which is indicated by the cycle the three inferences form in Figure 1). Moreover, also in the context of Piaget's structural developmental theory it is assumed that knowledge structures have to be upheld by their (successful) application in ordinary practice. It is a living process, not static or eternal.

EXAMPLES: THE ECONOMIC CONCEPT OF VALUE AND METHODS FOR ITS DETERMINATION

The basic approach: Cost plus a decent profit

Let us now consider an example of a process of knowledge acquisition and follow it across the inferential triad. Children below the age of ten usually do not exhibit an understanding of value as opposed to price, i.e. they believe that either the trader freely sets the price or that the government or an equivalent institution determines it (see e.g. Berti & Bombi, 1988, pp. 108–114). The price, so fixed, just has to be paid or else one has to leave it. In this understanding, money only functions as a means of exchange, not as a means to determine the value of goods, since an independent concept of value is not yet developed.

When asked why some goods are expensive and others cheap, children will often explain high prices in terms of beauty, rareness or necessity. However, most children at this age also understand that some basic goods are cheap, just because they are necessary, and that others are expensive, although they are not scarce at all. This is one kind of contradiction that is observed in the reasoning of those children (Claar, 1990, pp. 100–101). Another contradiction (from this perspective) is that traders may go bankrupt even though they have reasonable sales. What has to be understood here is that every business involves expenditures and that these expenditures have to be met and even topped by the revenues to result in a profit, which is the owner's income. Once this relationship is understood, the question of value becomes tractable.

A simple concept of value, with which the above cognitive conflict can be resolved, is that the producer or trader should be compensated for their costs and on top of that be allotted a reasonable remuneration for their work and maybe also their risk. The rationale is that costs plus a decent profit rate determines the just price and hence the value. A lower price would be below the value, a higher one above value. What is to be realized is that goods do not "fall from the heavens", but have to be produced and supplied and that this is to be understood as a process of creating and adding value to the input material. Thus, productive processes along the value chain explain the value of a product. This is the basic theory, which is also expressed by Michael Porter's famous model of the value chain (see Figure 2).

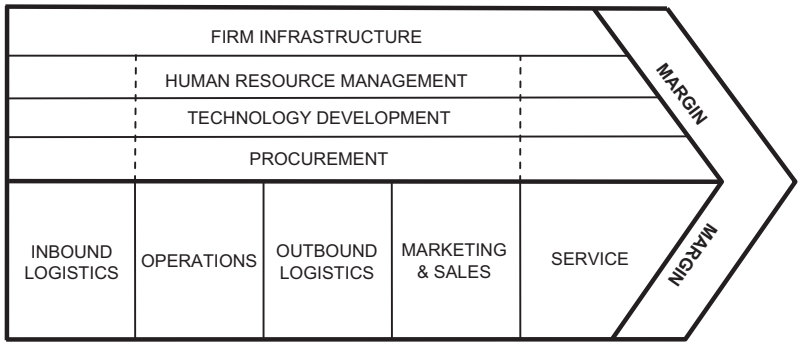

Figure 2. The value chain (Porter 1998, p. 37).

It should also be understood that the value chains of different companies in the productive chain form an overall value chain and that the conjoint performance of these companies determines the value of the final product (see Berti & Bombi 1988, pp. 127–128). Each contribution or value added in the sequence is calculated in terms of costs plus a decent profit margin for the amount of work that was put in, i.e. the real net output (for an elementary understanding it does not matter whether one distinguishes profits from salaries and wages, because all are regarded as income in return for some kind of labor or service). Logically speaking, the epistemic subject first infers to the described concept of value (abduction), figures out the theoretical values of products on this basis (deduction), and then examines how well these inferred values match with what is observed in the real world (induction).

Simple as it is, this theory is quite powerful. Various forms of price-estimation remain in its context. They just extend the scheme, but in fact do no more than assimilate costs or cost structures previously not considered. In the simplest case one just calculates the material built in the product, i.e. the direct cost, plus the amount of work (in hours) multiplied by a suitable factor in order to determine the equivalent amount of money.

The consideration of overheads complicates the matter a little, as these have to be allocated to the costing units. In the simple cost estimation scheme the overhead costs are divided by the number of units produced, yielding the overhead cost per unit (see Figure 3).

Direct cost per unit
+ Overhead cost per unit
Cost of production
+ Profit
Offer price (= value)

Figure 3. Simple cost and offer price estimation.

To be sure, many costs need not be understood at this basic level (especially write-offs), and will certainly not be understood by ten-year-olds. In particular, they are not expected to see that there has to be a return on investment on top of a return on the work and risk that the owner puts into his business.

Refinement

The initial step of contriving a suitable form of value estimation in terms of costing is an abductive one. First of all, determining the value in terms of cost plus profit is only one way, and perhaps an unacceptable one. But even if we remain within this basic conceptualization, dividing up the overheads is problematic, because what we need is not just any distribution of overheads, but the correct one. What we want is an allocation of costs according to causation. Now it may be in order to distribute them equally or, as seems more appropriate, in proportion of direct cost, but there are clearly infinite ways of dividing up the overheads and these are not originally present in the individual's mind, but have to be generated in the first place. This is why the reasoning that leads to a suitable costing suggestion is to be classified as an abduction. From it the cost of lots and units can be deduced, which can then be inductively evaluated by offering the products at the calculated price and observing what happens (whether the goods are sold and the expected profit comes out) or to compare real prices on real markets to see whether they (roughly) match with the scheme, i.e. to see how well the theory of determining the value of products accommodates the prices and hence the values that they actually attain on the market.

Such experience may lead to further revisions of the costing method. It may be noticed that some products cause high costs in terms of raw materials and storage while others are more production-intensive. In other words, different products cause different costs in different units of activity. Hence the overhead cost is to be recorded for each individual unit of activity and then redistributed to the costing units in proportion to the use of productive resources. If e.g. a materials cost center and a production cost center are (abductively) differentiated, this (deductively) results in two specific costing rates. However, since the manufacturing overhead does not depend on the cost of direct materials, a specific allocation based on the manufacturing costs is also needed. As such, one normally takes manufacturing labor, so that the mark-up is calculated as a percentage of the hourly rate of pay multiplied by the actual amount of work in hours put into the product. This rationale yields the common cost estimate sheet for the estimation of production cost (see Figure 4).

Setting up such a scheme is an act of abduction, because it is a theory about the assignment of costs to costing units according to causation. It is a possible answer to the question what values have gone into the product and are now materialized in it. And the answer is by no means necessary (for which reason it cannot be generated by deduction). For instance, it is questionable, whether the cost of manufacturing labor is indeed a suitable allocation base for the manufacturing overhead. Today, the bulk of manufacturing costs consists in the use of production facilities, which creates

Cost of direct materials	€100			
+ Materials overhead (20 %)	€ 20			
Cost of materials		*€120*		
Cost of manufacturing labor	€190			
+ Manufacturing overhead (100 %)	€190			
Manufacturing cost		*€380*		
Cost of production			*€500*	
+ Administrative overhead (7 %)			€ 35	
+ Selling overhead (3 %)			€ 15	
Cost of sales				*€550*
+ Profit (10 %)				€ 55
Offer price (= value)				***€605***

Figure 4. Cost estimate sheet including different allocation bases and costing rates.

excessive rates of manufacturing overhead. What's more, in most industries manufacturing labor is not a reliable allocation base, since some production processes involve more handicraft than others, hence the rates ought to be quite different for the various products. Here we have a new problem which might lead to the suggestion that we use machine hours as the allocation base rather than man hours. So we end up, again, with a new scheme, which is called "machine hour accounting" (see Figure 5).

In machine-hour accounting the overall overhead is divided into machine-dependent cost and the remaining overhead. The former is divided by the hours the machine runs in the respective period and allocated accordingly to the costing units. The latter is transformed, as before, into a costing rate by which the cost of manufacturing labor is marked up.

Cost of direct materials	€200			
+ Materials overhead (15 %)	€ 20			
Cost of materials		*€230*		
4 machine hours (at € 40 each)	**€160**			
Cost of manufacturing labor	€140			
+ Remaining overhead (50 %)	€ 70			
Manufacturing cost		*€370*		
Cost of production			*€600*	
+ Administrative overhead (11 %)			€ 66	
+ Selling overhead (4 %)			€ 24	
Cost of sales				*€690*
+ Profit (10 %)				€ 69
Offer price (= value)				***€759***

Figure 5. Cost estimate sheet with machine-hour accounting.

Of course, there are a few more technical hitches that would have to be addressed in the scheme, but this is of no great import for the problem at hand. What we have tried to show is that these complications necessitate further supplementations but do not alter the basic structure. The inclusion of additional aspects may pose certain mathematical problems, but so far no deeper economic understanding was required (at least if we do not inquire into the details of determining the components and measures of the costing factors).[1]

Towards a Higher Level of Economic Understanding

However, there are relevant aspects that do not fit in the present scheme. Consider, e.g., the fact that different companies have different cost structures. Even though they may all work hard and efficiently, they are in different economic situations. Different cost structures and factors, however, entail different prices, provided that each of them estimates their expenditures and revenues according to the rationale developed above. Now, if this general costing scheme is meant to determine not just a price but the *value* of the respective product, this reasoning becomes paradoxical, for the value of one and the same product (at the same place and time) has to be fixed. At least, this has to be so in the context in which the present reasoning is embedded, which consists in the question of determining the *objective value* of a product as opposed to fluctuating prices.

In order to experience this paradox one need not even inquire very deeply into the causes of different cost structures. It suffices to consider different production volumes. Direct cost varies with the quantities produced. Most of the overheads, however, are fixed or rise degressively. Therefore, higher output entails lower cost per unit whereas a decrease in production volume leads to an increase of unit cost. Costs may thus go up and down, but the value obviously cannot (at least not in the same proportion).

In this cognitive situation amending the existing theory is pointless. What is needed is a new theory of value and a new understanding of how it is determined. It now becomes clear that cost structures vary and that different sellers may (be able to) offer at different prices (or realize different profit margins). Normally, people would buy where things are cheapest. However, one producer rarely satisfies the whole demand. Therefore, the price has to go up, so that other producers may also sell at a profit. Those with the lowest cost, then, would earn the greatest relative margin, and the price would depend not only on production cost, but on both supply and demand.

Typically, only adolescents from the age of 15 onwards understand this relation (see Claar, 1990, pp. 108–110). It implies that the reasoning works both ways: from cost to price and from price to cost, i.e. one not only figures out the offer price based on the actual cost, but also calculates cost objectives and limits based on actual market prices. This is when cost accounting becomes all the more relevant, because one now sees that costs can be influenced (beyond the effect of mere effort) and seeks

to minimize them. One may also compare different products in terms of their profitability. Therefore, cost-unit period accounting would be an adequate tool to deal with this problem, and students at this level of understanding should be able to see the use of such a costing system.

As far as it goes, the main idea is still that there ought to be "good money for good work" and that those who do a good job (i.e. produce good quality efficiently) should be appropriately rewarded. It is only that now the activities of various manufacturers and the customers' demand are related to each other. This is fine as long as competition does its job and cares for an optimal allocation of resources and income. It becomes problematic, however, when some agents are capable of controlling others, or when the conditions of production differ. What if creditors or proprietors are in a position to suppress their debtors or those who work for them and depend on them? Those who actually do all the work would live in misery and most of the profit would go to the rich. Or take the case of production in low-wage countries. Those who do it produce more cheaply and consequently force prices down. However, the question may be raised, whether the value also decreases as a consequence of improved production methods, or whether the price is just "too low" (in fact, below value) due to the exploitation of impoverished workers abroad who do not get their fair share? Such possibilities are corollaries of the underlying cognitive structure (deduction), and wherever they actually obtain, they call for a suitable adjustment (induction). One such supplementary idea to solve this problem (abduction) would be the imposition of fixed prices and/or caring for equal conditions on the part of the suppliers so as to protect producers or consumers alike and preclude usury and exploitation.[2]

Further Extensions

The examples discussed so far have hopefully been instructive, but they have also been quite elementary. Therefore, we should consider one more example from an advanced level, which would perhaps be more relevant for further education. This is also to show that the fundamental inferential learning processes remain basically the same, although alternative ways of knowledge acquisition shall be considered further below in this section.

For instance, there may be a need to train professionals in modern cost accounting systems like "activity-based costing" or "target costing". These have been developed to meet new challenges (globalization, buyer markets, product differentiation and market segmentation) that did not exist in former times and under traditional production conditions. Indirect cost has risen sharply and the share of direct cost has fallen accordingly. Hence, the correct estimation and allocation of indirect costs has become both more important and more difficult. Instead of allocating the bulk of indirect costs by means of simple costing rates, it is necessary to analyze and record the specific cost-causing activities for each product or order (with special reference

to so-called "cost drivers"). This is the essential motivation for "activity-based costing" (see e.g. Cooper, 1988a; 1988b; 1989), for instance.

As for the logic of this instructive and constructive process it turns out that once again there is a new problem. Just as in the above cases, this new problem necessitates an abductive inference to a possible solution of this problem, which in this case consists mainly in a new system of recording and allocating the indirect costs that are caused in the various cost centres. Moreover, any such approach will have to be tested both deductively and inductively. Thus, inferential learning processes as such remain the same along the path towards more and more comprehensive, complex and abstract knowledge.

CONCLUSION

In conclusion I would like to emphasize four aspects that I consider particularly important in the context of vocational education and training. *First*, there are good grounds for assuming that cognitive learning is basically and essentially a matter of logical inference in terms of abduction, deduction and induction. The (still) rather common identification of knowledge acquisition with "information input" misses the mark, and the inferential approach gives meaning to the otherwise rather vague constructivist ideas.

Second, much is being said and written today on life-long learning. Abduction, deduction and induction seem to be the necessary and appropriate tools for that. Together they constitute a systematic method for the generation and evaluation of new knowledge and, if consequently persisted in, this method virtually guarantees, due to its recursive nature, life-long and expansive learning (for the latter, see e.g. Engeström, 2001; 2005) and also in the context of workplace learning from an applied learning perspective (see e.g. Pridham, O'Mallon & Prain, in press; see also Breuer & Eugster, 2006).

Third, and also in the context of life-long learning, much of what is learnt apparently remains "inert". The inferential triad provides an answer to the question why people do not make use of their previously acquired knowledge (see also Minnameier, 2005b). It is important, but not enough, to be able to apply certain rules like the costing schemes discussed above (which mainly concerns deductive operations within a given rationale). Whether one understands the relevance of the costing schemes and the reasons why they are actually set up in the way they are, is quite something different. These are the parts of abduction and induction.

Fourth and finally, one may well understand and be able to handle certain theories or concepts, and still not accept them. Whereas novices are normally quite ready to take on ideas and suggestions from their expert mentors, adult professionals require reasons for what they should believe. Effective teaching has to convince the student that what is learnt is practicable and worth practicing, that it is both functional and expedient (see also Breuer & Molkenthin, 2006). This not only entails that what is

learnt has to address problems the learner actually has or might have (abduction), but also that it is shown to work in real practice and to be the best way to tackle those problems (induction). Being able to evaluate actions or rationales in real or authentic situations is also an important aspect of competence testing, as Klaus Breuer has revealed (see e.g. Breuer, 2006, pp. 197–198). The inferential theory covers all these aspects and thus provides a systematic basis for the respective analysis and planning of teaching and learning processes.

NOTES

[1] Difficult aspects may be depreciation allowances, imputed interest charges and wages of management. These are thought to be difficult, because they are abstract notions that do not reflect the values as they are conceived at this level of understanding. For instance, the value of a fixed asset is thought to measure its original value minus a deduction for the real wear and tear, not for its economic life. This marks the difference between an objective notion of value (or a certain version of it) and subjective or local value that the asset has for a given company at a given time.

[2] So far and as far as I know it has not been investigated, whether and to what extent teenagers actually reason in that way, but Berti and Bombi (1988, p. 124) report the case of a 12-year-old who considers various possibilities of price-fixing, i.e. whether prices should be fixed by the shopkeeper or by the law. Asked what he thinks would be fair, he replies that it would be fair if there were the same price for everybody.

REFERENCES

Bartelborth, T. (1996). *Begründungsstrategien: Ein Weg durch die analytische Erkenntnistheorie*. Berlin: Akademie.

Bartelborth, T. (1999). Coherence and explanations. *Erkenntnis, 50*, 209–224.

Berti, A. E., & Bombi, A. S. (1988). *The child's construction of economics*. Cambridge: University Press.

Boyd, R. (1990). Realism, approximate truth and philosophical method. In C. W. Savage (Ed.) *Meaning and method: Essays in honour of Hilary Putnam*. Cambridge University Press, 355–391.

Breuer, K. (2006). Kompetenzdiagnostik in der beruflichen Bildung – eine Zwischenbilanz. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 102*, 194–210.

Breuer, K., & Eugster, B. (2006). Effects of training and assessment in vocational education and training (VET): Reflections on the methodology of assessing the development of traits of self-regulation. *Studies in Educational Evaluation, 32*, 243–261.

Breuer, K., & Molkenthin, R. (2006). Zur Diagnostik der Lenkungskompetenz in komplexen Unternehmenssimulationen. In G. Minnameier, & E. Wuttke (Eds.) *Berufs- und wirtschafts-pädagogische Grundlagenforschung. Lehr-Lern-Prozesse und Kompetenz-diagnostik - Festschrift für Klaus Beck*. Frankfurt: Lang, 361–376.

Claar, A. (1990). *Die Entwicklung ökonomischer Begriffe im Jugendalter: Eine strukturgenetische Analyse*. Berlin: Springer.

Cooper, R. (1988a). The rise of activity based costing – Part one: What is an activity-based cost system? *Journal of Cost Management, 2, Summer*, 45–54.

Cooper, R. (1988b). The rise of activity based costing – Part two: When do I need an activity-based cost system? *Journal of Cost Management, 2, Fall*, 41–48.

Cooper, R. (1989). The rise of activity based costing – Part three: How many cost drivers do you need, and how do you select them? *Journal of Cost Management, 3, Winter*, 34–46.

da Costa, N. C. A., & French, S. (1989). Pragmatic truth and the logic of induction. *The British Journal for the Philosophy of Science, 40,* 333–356.

Earman, J. (1992). *Bayes or bust? A critical examination of Bayesian confirmation theory*. Cambridge: MIT Press.

Engeström, Y. (2001). Expansive learning at work: Toward and activity theoretical reconceptualization. *Journal of Education and Work, 14*, 133–156.

Engeström, Y. (2005). *Developmental Work Research. Expanding Activity Theory in Practice.* Berlin: Lehmanns Media.

Hasselhorn, M., & Gold, A. (2009). *Pädagogische Psychologie: Erfolgreiches Lehren und Lernen* (2. ed.). Stuttgart: Kohlhammer.

Hempel, C. (1966). *Philosophy of natural science*. Englewood Cliffs: Prentice-Hall.

Hookway, C. (1997). Logical principles and philosophical attitudes: Peirce's response to James's pragmatism. In R. A. Putnam (Ed.) *The Cambridge Companion to William James.* Cambridge University Press.

Josephson, J. R. (1994). Conceptual analysis of abduction. In J. R. Josephson, & S. G. Josephson (Eds.) *Abductive inference: Computation, philosophy, technology*. New York: Cambridge University Press, 5–30.

Josephson, J. R. (2000). Smart inductive generalisations are abductions. In P. A. Flach, & A. C. Kakas (Eds.) *Abduction and induction: Essays on their relation and integration*. Dordrecht: Kluwer, 31–44.

Lipton, P. (1991). *Inference to the Best Explanation.* London: Routledge.

Magnani, L. (2009). *Abductive cognition: The epistemological and eco-cognitive dimensions of hypothetical reasoning*. Berlin: Springer.

Meyer, M. (2009). Abduktion, Induktion – Konfusion. *Zeitschrift für Erziehungswissenschaft, 12,* 302–320.

Minnameier, G. (2004). Peirce-suit of truth: Why inference to the best explanation and abduction ought not to be confused. *Erkenntnis, 60*, 75–105.

Minnameier, G. (2005a). *Wissen und inferentielles Denken: Zur Analyse und Gestaltung von Lehr-Lern-Prozessen*. Frankfurt am Main: Lang.

Minnameier, G. (2005b). Wissen und Können im Kontext inferentiellen Denkens. In H. Heid, & C. Harteis (Eds.) *Verwertbarkeit – ein Qualitätskriterium (erziehungs-)wissenschaftlichen Wissens?* Wiesbaden: VS-Verlag, 183–203.

Minnameier, G. (2010a). Abduction, induction, and analogy – On the compound character of analogical inferences. In W. Carnielli, L. Magnani, & C. Pizzi (Eds.) *Model-based reasoning in science and technology: Abduction, logic, and computational discovery*. Heidelberg: Springer, 107–119.

Minnameier, G. (2010b). The logicality of abduction, deduction, and induction. In M. Bergman, S. Paavola, A.-V. Pietarinen, & H. Rydenfelt (Eds.) *Ideas in Action: Proceedings of the Applying Peirce Conference*. Helsinki: Nordic Pragmatism Network, 239–251.

Minnameier, G. (2011). What's wrong with it? – Kinds and inferential mechanics of reasoning errors. In J. Seifried, & E. Wuttke (Eds.) *Learning from errors*. Opladen: Barbara Budrich, 13–29.

Ormrod, J. E. (2010). *Educational psychology: Developing learners* (7th ed.). Upper Saddle River: Prentice Hall.

Paavola, S. (2006). Hansonian andHarmanianabduction as models of discovery. *International Studies in the Philosophy of Science, 20,* 93–108.

Peirce, C. S. (CP) (1935–1958): *Collected Papers of Charles Sanders Peirce* (ed. by C. Hartshorne, P. Weiss, & A. Burks). 8 vol., Cambridge: Harvard University Press. (The first number of the references indicates the volume, the second number indicates the paragraph.).

Popper, K. R. (1959). *The logic of scientific discovery*. London: Hutchinson.

Popper, K. R. (1971). *Logik der Forschung*. 4. Aufl. Tübingen: Mohr.

Porter, M. E. (1998). *Competitive advantage: Creating and sustaining superior performance*. 2nd ed., New York: The Free Press.

Pridham, B., O'Mallon, S., & Prain, V. (2012). Insights into Vocational Learning from an Applied Learning Perspective. *Vocations and Learning*, *5,* 77–97.

Schurz, G. (2008). Patterns of abduction. *Synthese, 164*, 201–324.

Smith, H. E. (2007). *Teaching adolescents: Educational psychology as a science of signs.* Toronto: University Press.

Stegmüller, W. (1976). *The structure and dynamics of theories*. New York: Springer.
Suppe, F. (1989). *The semantic conception of scientific theories*. Urbana: University Press.
Thagard, P. (1996). *Mind: Introduction to cognitive science*, Cambridge: MIT.

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WORK-STUDY PROGRAMS FOR THE FORMATION OF PROFESSIONAL SKILLS[1]

INTRODUCTION

Policy-makers consider workplace learning as an effective strategy for the development of vocational, career and professional identity (Tynjälä, Välimaa & Sarja, 2003). Work-study programs, in which learning at school and learning at work are integrated, are seen as strong carriers for skill formation processes. They are expected to increase students' employability. Students who do not participate as an apprentice in a work-study trajectory gain work experience through internships, where they are not considered formally as employees. Since the 1990s the number of students in Dutch work-study programs in higher professional colleges has increased significantly. The Higher Education and Research Act determines that work within the work-study program is subject to an agreement (contract) between the education institution, the student, and the company where the student is employed. This agreement concerns contract duration, working hours, guidance, learning goals (competencies) and assessment. As employees, apprentices spend much more time at work than other students. It is assumed, therefore, that they are given different tasks and responsibilities at work and are more responsible for their own learning process. They are therefore considered to develop more generic and specific competencies and flexibility. Combining learning at school and the workplace is expected to provide a basis for lifelong learning; to enhance transfer from school learning to practice; to enhance skill development; and to reinforce academic skills and personal development (Poortman, 2007). This optimism on the impact of workplace learning is challenged by empirical evidence, however (Bailey, Hughes & Moore, 2004; Gruber, Harteis & Rehrl, 2008; Nelen, Poortman, Nieuwenhuis, De Grip & Kirschner, 2010; Nijhof & Nieuwenhuis, 2008). For example, academic skills are not reinforced, and although occupational skills are developed in many situations this is not always automatically the case. In educational policy and design these research results are often neglected. This leads to the question whether the learning environment in work-study programs is in fact effective. There is little insight into the design of learning environments in work-study programs, students' learning processes and their learning outcomes.

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 157–168.

To be able to assess the effectiveness of work-study programs, we first need to describe these programs in relation to programs with internships. Secondly, we need to study which factors are related to competence development. The research questions for this study are, therefore:

1. Which differences can be identified in the learning environment of apprenticeship work-study trajectories and internship programs?
2. What characteristics of the learning environment of the work-study program influence development of competencies?

RESEARCH MODEL

We assume that competence development resulting from the learning process is influenced by the interaction between the learning environment and characteristics of the student. This is visualized in the research model presented in Figure 1.

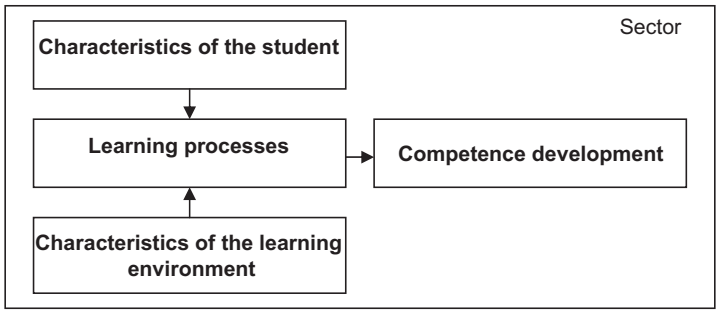

Figure 1: Research model.

Students' characteristics are, for example, age, prior knowledge and personality characteristics (see e.g. Baldwin & Ford, 1988; Nijman, 2004). Regarding the learning environment, apprentices are basically employed in a real workplace and are enrolled in school to obtain a higher education diploma. Both school and work are part of the learning environment. The proportions of working and learning depend on the specific track. To describe the learning environment and related processes we use location, mode, instruction, content, sequence, assessment and cooperation between school and company as main characteristics (Blokhuis, Jellema & Nijhof, 2002). Location, for example, refers to whether students learn off or on the job, whether the workplace is real or simulated, and whether workplace learning takes place in one or in several departments or companies. Sequence refers to the order of the learning activities: is the work structure related to the goals and objectives in the course or is learning related to the work as it normally takes place in the company?

Do students start with straightforward tasks or are they engaged in complex work activities right away? These characteristics are described in more detail in Table 1.

Table 1: Learning environment characteristics

Characteristic	***Description***	***Options***
Location	Where does workplace learning take place?	Real or simulation One or more departments/companies On or off the job
Mode	Way of learning	Individual/team Formal/informal Employable from start/later
Instruction	Type of instruction	Emphasis on learning/working Showing/discovering Directing/creating conditions
Content	Structure of learning content	Planned/guidelines Single tasks/integrated competencies
Sequence	Order of learning activities	Work structure related to intended competencies/learning related to work at workplace Start with straightforward/complex tasks
Assessment	Assessment method regarding workplace learning from both school and workplace. Concluding part of learning process with assessment	Written/verbal Emphasis on theory/practice National (examination), school- or workplace-specific With/without relation to competencies
Cooperation	Extent of alignment between school and practice and responsibility for learning process from those involved	Hardly any/a lot of cooperation and integration Individual responsibility/shared

Particular options do not automatically imply a more effective learning environment than other options. The ways in which these options are realized and combined, however, are expected to determine the quality of learning and its outcomes. For example, when a student starts working with very sensitive, expensive equipment, "showing" is an important type of instruction, whereas workplace mentors might be more inclined to have the student "discover" the best way to communicate with others at work. Depending on the goals and objectives related to the particular work-study program, particular options related to "location" and "sequence" may be more relevant than others. This also depends on the characteristics of the particular

student. This means that the realization of these characteristics and related options needs to be described in context.

METHOD

To explore the differences in the learning environment of apprenticeship work-study trajectories and internship programs, and describe the influence of learning environment characteristics of work-study programs on the development of competencies, we made use of a survey.

Design and instruments

To be able to measure competence development, a pre-post (quasi-experimental) design is required. Students could not be randomly assigned to treatments; however, we conducted a pre- and post-test questionnaire with existing groups of students who followed either the apprenticeship or the internship trajectory. The study has a longitudinal character because competence development is measured with the help of a questionnaire about the current level (Q1) and two repeated measures (Q3 and Q4). To describe the relation with the learning environment, Q1 also concerns questions about the characteristics of the learning environment. Personality characteristics (Q2) were measured to account for their influence on competence development. Because personality characteristics are considered to be relatively stable, they were measured separately from Q1. Otherwise, the length of Q1 might have reduced the response.

In terms of the characteristics of the learning environment, Q1 is based on the framework in Table 1. Students were asked about the extent to which the learning environment concerned on or off the job learning, or written or verbal assessment, for example, on a five-point Likert scale (from "completely agree" to "completely disagree"). In terms of competence development, an existing questionnaire (Toolsema, 2003) was adapted for students at the professional college level. The related competence categories are; social, participative, cognitive, technical, learning and career development competencies. Students were asked to assess these in terms of the "no experience" to the "expert" level, based on Dreyfus and Dreyfus's (1982) levels of "novice" to "expert".

Personality characteristics were measured by developing a separate questionnaire (Q2) using abbreviated NEO-PI-R items from the International Personality Item Pool (IPIP), corresponding to the Big Five dimensions; Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Self-efficacy, intellect (both based on IPIP scales) and motivation (as based on Blokhuis, 2006) were added because they are considered to strongly influence developing and applying learning outcomes. Students were asked to assess the items on a five-point Likert scale ("very inaccurate" to "very accurate"). Questionnaire Q4 measures competence development in terms of the actual capability of respondents to apply their knowledge and

skills at work. This questionnaire was based on the same competence categories as Q1 and Q3; however, students were asked to assess the level of application on a six-point Likert scale ranging from "never" to "very often". To gain insight into aspects such as the connection between the Higher Professional Education (HPE) program and the job, questions about the context after graduation were added.

Sample

Third-year HPE students have usually experienced at least one internship or a significant part of the work-study program and were chosen as the subject of this study for this reason. HPE institutions with apprenticeship programs were selected and also asked to approach their internship students for the study. All HPE sectors are represented in the study. The first questionnaire (Q1) was administered at the end of 2004, followed by the personality questionnaire Q2 in mid 2005. The second competence development questionnaire Q3 was administered in the second half of 2005, and the final competence application questionnaire Q4 was administered in mid 2007. The survey design is summarized in Table 2.

Table 2. Survey design

Questionnaire and year	*Response*	*Subject*
Q1: end of 2004	1200	Characteristics of the learning environment Pre-test current competence level (perceived)
Q2: mid 2005	933	Personality characteristics
Q3: second half 2005	728	Competence development (perceived)
Q4: mid 2007	310	Competence development (application at work)

Factor analysis and reliability of the questionnaire

The results of the questionnaires were analyzed using SPSS. A factor analysis (varimax rotation) showed that six factors, corresponding with the competence categories (social, participative etc.) explained 50% of the variance. These categories were therefore identified as relevant for the study. The reliability (Cronbach's α) of the competence categories is high, ranking from 0.79 to 0.95. This measure was higher than 0.74 for the personality characteristics, which is also considered fairly high.

FINDINGS

To answer the first question of the survey (learning environment differences between apprenticeships and internships) the responses of 1200 students who completed Q1 were used. In this group of students, 139 students followed an apprenticeship

program. To answer the second research question, the response of 514 students who completed Q1, Q2 and Q3 were used. Of these students 65 followed an apprenticeship.

In general more female students participated in the study. Most of the students were born between 1980 and 1984. The apprenticeship students were generally older than the internship students. Most of the students' previous education was senior general secondary education. Apprenticeship students more often had senior secondary vocational education and training as their preliminary education than internship students. The business sector contains the largest number of students. Agriculture, and 'language and culture' contain the smallest number of students. The latter does not contain any apprenticeships.

Learning environment differences

The "typical" differences regarding learning environment characteristics (Table 1) between the types of programs were confirmed. Apprenticeship students, for example, learn "on the job" to a significantly greater extent than internship students. In addition, their learning environments make less use of simulation. With regard to time spent at the workplace, logically a significant difference was found: internship students spend between 673 and 1008 hours at the workplace, generally in undivided periods. Apprenticeship students generally work between 673 and 1344 hours during their training period, and usually alternate school and work.

Internship students gain work experience in more different departments and companies than apprentices. Apprenticeship students work more independently from the start. They have slightly more opportunities to decide independently on their work tasks. Internship students feel that responsibility is more shared between school, company and student than do apprentices. The learning content and learning goals of the school guide the activities significantly more with internships.

In both contexts, the work process is more directive for the activities in the training company than the learning content. Although the connection and cooperation between school and work is low in both contexts, it is significantly higher for internships. No significant differences were found in relation to individual versus team learning; formal or informal learning; type of instruction; structure of learning content; or straightforward versus complex tasks.

Differences were also apparent within the sectors. A characteristic that was significantly different in the apprenticeship programs as a whole, but only specifically in the sectors of business and society and human behavior, was "communication between school, student and his/her workplace". Here, school, workplace and student cooperate more in the internship context than in the apprenticeship context. In the health sector apprentices work significantly more in a team, while in the society and human behavior sector they work more individually. In addition, there was no significant difference related to the characteristic of *real* versus *simulation*. In the business and society and human behavior sectors, there was no significant difference related to gaining experience in different departments/companies. In the

apprenticeship program as a whole there was no significant difference regarding this characteristic. Although some differences can be found in the program as a whole, some are more related to apprenticeships in specific sectors. The findings show that specific sectors and even different institutions and companies within these sectors show very different patterns of work-study combinations.

Influence of learning environment on competence development

To answer the question about the influence of the learning environment on competence development, the responses to Q1 and Q3 were used. The responses to Q2 were used to check the influence of personality characteristics. Age, gender and previous education were also taken into account. The responses to Q1 were used to analyze the influence of prior knowledge.

The findings show that, except for technical competence, both groups of students had progressed in general. Apprentices (Q3: 3.54) and interns (Q3: 3.15) differ significantly only regarding participative competencies (scale from 1 = no experience to 6 = expert). When regarded per sector, the education students felt they had *less* experience in the social, cognitive, participative and technical competencies at the second measurement. The language and culture sector students felt less experienced at the second stage regarding their social and technical competencies. In the technology, health and agriculture sectors, students felt they had progressed regarding all competence categories, including the technical category. The sectors differ significantly regarding all competence categories (Reenalda, 2011, pp. 47–49).

Background factors

Regression analysis shows that prior knowledge is the most important influencing variable for the group of students as a whole, per program and per sector. Regarding personality characteristics, there are statistically significant differences between apprenticeship and internship students. In addition, different personality characteristics have different influences on competence development (Reenalda, 2011, pp. 60–61).

Altruism mainly has a negative influence on several competencies, except for apprenticeship students regarding their career development where the influence is positive. Conscientiousness has a positive effect on all of the competencies for most of the students. Extraversion positively influences learning and career development competencies for many of the students, and for technology students it influences participation competence positively. Openness has a positive influence on social, participation and cognitive competencies for business students; both internship students and technology students experience a positive influence on their learning and career development competencies. While many of the students experience that neuroticism has a positive influence on their learning and/or career development competencies, it has a negative influence on participation competence for most of the

students. Remarkably, motivation to learn only has an effect on career development competencies for students in teacher training (education). Intellect appears to have a positive influence on the development of technical competence for business students and of learning competence for technology students. For several student groups and competence categories, self-efficacy has a positive influence. In fact, self-efficacy was not found to have any negative influences.

Between sectors, significant differences have been found on extraversion (p=0.002), altruism (p=0.000), openness (p=0.000), neuroticism (p= 0.009), and self efficacy (p=0.038). Between apprenticeship and internship students, one significant difference has been found, on conscientiousness (p=0.070).

There is one factor of the learning environment that has dominated the educational discussion for many years: *amount of time spent on learning or working*. In many studies active learning time or student hours are seen as a potential factor for learning effects. The amount of time that students invest in both trajectories has been calculated and compared. The outcome is that in fact the amount of time spent in the workplace does differ significantly between the groups, but does not significantly influence competence development. The apprenticeship program has a small positive effect on participative competencies. Apprentices in the health care sector additionally experience a positive influence on their career competencies.

However, the time spent on academic study and in the workplace differs between sectors. The differences are sometimes significant and rather specific. In health care, for instance, a time investment of between 1009 and 1344 hours of working a year in a closed session has been chosen.

The learning environment might be *real* or *simulated* or *virtual*. We found that more simulation appears to have a negative effect for the whole group and for apprenticeship students across most competencies. Alternation between departments within companies appears to have a positive effect for particular sectors concerning some competencies, but is negative for health students concerning their career competencies (Reenalda, 2011, p. 76).

More *on the job learning* is positive for several competencies for society and human behavior students and for the cognitive competencies of health students. Technology students, however, experience a negative influence on the development of their technical competence from more on the job learning. Internship students benefit from teamwork in relation to development of participation competence. Technology students experience a positive influence from teamwork in terms of development of their technical competence. For business students, however, more teamwork has a negative influence on their social and cognitive competencies. For the total group, and society and human behavior students in particular, more formal learning has a positive influence on the development of their social and technical competence. For education students, however, more formal learning had a negative influence on their technical competence.

When students work from the start in the workplace, this positively influences the development of cognitive competences, in particular for internship and education

students. Work also has a positive influence on the social competencies of society and human behavior students, and on the participation competencies of health care students. However, it had a negative influence on the development of technical competences for business students, and on learning competencies for education students.

More "showing" has a negative influence on the development of the participation, cognitive and learning competencies of internship students; and the whole group is also negatively influenced regarding learning competencies. However, more "showing" had a positive influence regarding the participation competence for internship students, and on career development competencies for technology students. While more "discovering" has a positive influence on the development of social competence for health students, and of participation competence for the whole group, it negatively influences the development of social competence for society and human behavior students. More direction has a negative influence on particular competencies for the whole group, internship students and business students. A more planned learning process positively influences particular competencies for particular sectors. More integration between school assignments and practical work has a negative influence on the development of technical competence by internship and technology students; however, it has a positive influence on the career development competence of education students.

When the learning process is better related to the intended content (curriculum), it has a positive influence on the participation competence of society and human behavior students but not their learning competencies. The latter also applies to technology students, while education students do benefit from more relation to the intended content regarding learning competencies.

Starting the program with more straightforward tasks has a negative influence for the society and human behavior students in terms of their participation competencies, and for technology students in terms of their cognitive competencies. When assessment is related to previously determined learning goals, it has a positive influence on the cognitive competencies of technology students and on the career development competence for business students. For health students, however, starting with more straightforward tasks has a negative influence on their cognitive competencies, and for society and human behavior students it has a negative influence on their learning competencies.

Remarkably, more cooperation and integration has negative influences for the development of the social, cognitive and participation competencies of technology students and for the development of participation competence of all students as well. More shared responsibility, as opposed to more cooperation, does have positive influences on competence development. This applies to the development of cognitive competence for all students and for education and internship students in particular. In addition, education students experience a positive influence related to participation, while technology students are positively influenced regarding technical competencies.

Detailed analysis of the results shows that "simulation", "productive from the start", "cooperation and integration" and "more shared responsibility" have an

unambiguous influence on most students' competence development. If we consider these characteristics alone, apprenticeship and internship programs should not make use of simulation, students should work from the start, schools should not lead practice using assignments to a great extent, although a high shared responsibility between school, practice and student is beneficial for students. Most of the results however are very specific to sector or to the competences being developed.

CONCLUSIONS

The findings show that the "typical" differences between internships and apprenticeships in relation to, for example, on the job learning, real workplaces or job rotation, are confirmed. Apprentices seem to be more productive from the start in their workplace. Regarding competence development, the findings show that the significant differences are small and specific to sector and competence category. In our opinion, differences in competence development depend more on the sector and work processes than on the type of HPE-program (see Reenalda, Nijhof, Nieuwenhuis & Veldkamp, 2009; Reenalda, 2011). Competence development is also heavily influenced by prior knowledge. Conscientiousness as a personal characteristic generally has the most positive influence on competence development.

The results, however, do not produce the most favorable model of learning environment to promote development of competencies. There is wide variation in intentions and the actual implementation of curriculum ideas and workplace guidance among or even within the sectors, without any clear-cut rationality or design. The question is how workplace learning could be supported more unequivocally within higher professional colleges. To answer this question, the underlying design of learning environments in HPE and related learning processes should be studied in more detail to gain evidence through experimental studies.

NOTES

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REFERENCES

Bailey, T. R., Hughes, K. L., & Moore, D. T. (2004). *Working knowledge*. Work-based learning and education reform. New York: RoutledgeFalmer.

Baldwin, T. T., & Ford, J. K. (1988). Transfer of training: a review and directions for future research. *Personnel Psychology, 41*, 63–105.

Blokhuis, F. T. L. (2006). Evidence-based design of workplace learning. Enschede: Universiteit Twente.

Blokhuis, F. T. L., Jellema, M., & Nijhof, W. J. (2002). *De kwaliteit van de beroepspraktijkvorming: Een onderzoek naar praktijken en ervaringen met de beroepspraktijkvorming bij ROC Eindhoven.* Enschede: Universiteit Twente.

Dreyfus, H. L., & Dreyfus, S. E. (1982), *Mind over machine; the power of human intuition and expertise in the era of the computer.* New York: Free Press.

Gruber, H., Harteis, C., & Rehrl. M. (2008). Vocational and professional learning: skill formation between formal and informal learning. In K. U. Mayer, & H. Solga (Eds). *Skill formation; interdisciplinary and cross-national comparisons.* New York: Cambridge University Press.

Nelen, A., Poortman, C.L., Nieuwenhuis, L., De Grip, A., & Kirschner, P. (2010). *Het rendement van combinaties van leren en werken*. Een review studie. Uitgevoerd op verzoek van de PROO-NWO. Projectnr. 411-08-301.

Nijhof, W. J., & Nieuwenhuis, L. F. M. (Eds.) (2008). *The Learning Potential of the Workplac*e. Rotterdam: Sense Publishers.

Nijman, D. J. J. M. (2004). *Supporting transfer of training: Effects of the supervisor.* Enschede: University of Twente. Dissertation.

Poortman, C. L. (2007) *Workplace learning processes In senior secondary vocational education and training*. Enschede: University of Twente. Dissertation.

Reenalda, M. (2011). *Effecten van Dualisering in het HBO.* Enschede: University of Twente. Dissertation.

Reenalda, M., W., Nijhof, J., Nieuwenhuis, L. M. F., & Veldkamp, B. (2009) *Effecten van duale leeromgevingen in het HBO; deel 1: kwantitatieve analyse* (impact of dual learning environments in HPE, part 1, quantitative analysis). Enschede: Twente University.

Toolsema, B. (2003). *Werken met competenties: Naar een instrument voor de identificatie van competenties* (Towards an instrument for identifying competencies). Enschede: Print Partners Ipskamp.

Tynjälä, P., Välimaa, J., & Sarja, A. (2003). Pedagogical perspectives on the relationships between higher education and working life. In *Higher Education, 46*, 147–166.

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IMPROVING THE PROFESSIONAL COMPETENCE OF LOW-ACHIEVING APPRENTICES

How to Use Diagnostics for Successful Training

INTRODUCTION

Diagnostics play an important role in the pedagogical field. For example, researchers make use of standardized test instruments in order to measure competences or skills of large groups of students. Teachers, in contrast, use less standardized methods to evaluate their students' individual learning progress. On the following pages we illustrate that both of these diagnostic approaches are important and may be combined in order to develop a successful pedagogical intervention or training concept: (1) Standardized measures used in the research process deliver general data on the students' (average) abilities and therefore serve as a basis for the overarching training concept. Their continuous use not only allows for evaluation of the overall training success but may also provide valuable information for improving the training scheme. (2) Non-standardized individual diagnosis becomes crucial when the training is brought into practice as it is here that the students receive individual support for their specific needs. We will elaborate on these points by describing two successive intervention studies (BEST-Study I and BEST-Study II). Both studies were carried out in classes of full-time vocational schools providing the first year of training for building trade apprentices (*einjährige Berufsfachschule Bautechnik*). The main objective of the studies was to develop a training concept that would promote the professional competence of the often low-achieving apprentices in these classes.

POINT OF DEPARTURE

The chances for young people to enter into apprenticeships in Germany have generally improved over the last few years (BMBF, 2012, p. 10). Nevertheless, the situation remains difficult for low-achieving adolescents. Employers offering the most attractive apprenticeships often have many applicants and can select the very best candidates. Traditionally, it is the small companies in the building trade that employ low-achieving young men and offer training in, for example, bricklaying, plastering or tiling. Even though the academic demands in these professions are comparatively low, many of the apprentices are at risk of failing exams and, as a result, dropping out of school or quitting the training (Bundesinstitut für Berufsbildung, 2011, p. 187).

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 169–182.

Dropping out is a serious problem for these low achievers as their chances of finding another apprenticeship (with different or even lower requirements) are remote. They mostly end up in the so-called "transition system" (Übergangssystem) that in many cases does not provide a direct transition into work or apprenticeship but often proves to be a dead end (Bundesinstitut für Berufsbildung, 2011, p. 93).

Our research aim was to develop a training concept that would help the apprentices to overcome their difficulties and keep pace with the higher achievers of the class. In a first step it was necessary to detect possible reasons for the apprentices' learning difficulties. Even though we have to assume that the problems are manifold (Bojanowski, Eckardt & Ratschinski, 2005) and sometimes go beyond what can be dealt with in school, research findings indicate that the apprentices' low level of basic skills and their use of inappropriate learning strategies play an important role. Several studies show that poor numeracy skills are especially common among this group. This means the young apprentices can hardly perform basic arithmetic operations and often give up when they have to solve more complex mathematical tasks (cf. Ivanov & Lehmann, 2005; Averweg, Schürg, Geißel & Nickolaus, 2009; Nickolaus & Norwig, 2009). Additionally, it is known that lower achievers often do not follow a plan when attempting to solve a task or problem. Contrary to effective problem-solvers, they seldom apply cognitive and metacognitive learning strategies, or use less effective ones (Klauer & Lauth, 1997, for example). Against this background it is not surprising that lower-achieving apprentices struggle hard to fulfill the curricular requirements, i.e. to build up new (professional) knowledge or to solve professional tasks that combine a wider range of demands (such as professional knowledge, technical mathematics and technical drawing) (Lutz, 2007). As a result they are often caught in a vicious circle of low skill level, serious learning problems, negative learning experiences, and, finally, a loss of motivation (Straßer, 2005, for example).

In principle, all of the problems mentioned above (i.e. low level of basic and professional skills, lack of effective learning strategies and poor motivation) need to be taken into account when designing a training concept for low-achieving apprentices. We decided, however, that the training should focus on the apprentices' use of cognitive and metacognitive strategies. Two reasons support this decision. Firstly, both types of strategy can be limited in number, i.e. some central strategies can be selected for the training. Secondly, cognitive and metacognitive strategies are widely considered to be of great importance for successful and independent learning (Straka, 2006, for example). However, it must be pointed out that the training of cognitive and/or metacognitive strategies does not necessarily lead to improved learning (cf. Bendorf, 2005; Elke, 2007; Tiaden, 2006; Wuttke, 1998; 2000; Tenberg, 2008). Several reasons may be assigned to this: e.g. problems related to testing (test methods, test instruments), the design of the training concept or implementation quality (see Tenberg, 2008 for an overview). What seems to be crucial for a successful strategy training is: (1) to combine cognitive and metacognitive strategies, i.e. to teach the use of specific (professional) problem-solving strategies together with

the use of metacognitive strategies (Hasselhorn, 1992; Mähler & Hasselhorn, 2001; Schreblowski & Hasselhorn, 2006), (2) to link the strategy training directly to the context of application (Hasselhorn, 1992; Mähler & Hasselhorn, 2001; Nüesch & Metzger, 2010), i.e. to embed the training into vocational classes, and (3) to incorporate basic (and professional) skill training in order to provide a firm basis for future learning processes (Hasselhorn, 1992).

THE BEST-TRAINING

Based on these findings, we developed the BEST-Training (BEST being an acronym for *Berufsbezogenes Strategietraining*, which means "professional strategy training"). The training concept basically draws on the idea of combining cognitive and metacognitive strategies. Metacognitive strategies are global strategies, i.e. their use is not restricted to a specific domain or subject. In fact, they can be used in multiple situations or domains and can therefore be considered as general learning or problem-solving strategies. Following the inherent logic of learning or problem-solving processes, metacognitive strategies are quite limited in number and are usually grouped into strategies of planning, monitoring and evaluation (see Brown, 1983; Leopold, 2009; Schreblowski & Hasselhorn, 2006, for example). Cognitive strategies are more local strategies, i.e. they can only be applied to certain types of tasks and are therefore specific for each domain. As each type of task requires a different cognitive strategy, their number is, of course, unlimited. Their advantage is, however, that they provide a direct solution to the problem. It is the combination of both types of strategy that makes them effective tools for solving complex professional tasks and can help the low-achieving apprentices to improve their learning and enhance their professional development. The term "professional strategy training" refers to another important aspect of the training: Unlike many other strategy training programs, the contents of the BEST-Training are directly linked to the contents of the vocational classes. This means the apprentices work on tasks similar to those they work on in class. As building-related professional tasks often require the use of basic mathematics, the training also provides many opportunities to work on the apprentices' poor numeracy skills. This in turn should additionally promote the low-achievers' professional competence.

BEST-Study I

In order to evaluate the effectiveness of the BEST-Training we conducted a first intervention study in the school year 2008/09 (BEST I).[1] A total of 13 classes and N = 253 students participated in this study. The strategy training was carried out in two classes of lower-achieving apprentices (plasterers and tilers; N = 40), another five classes of the same or similar professions (such as bricklayers) were taken as direct control groups (N = 92). In order to allow for comparisons with higher-achieving apprentices from the same domain, five classes of carpenters and one class of

architectural drafters (N = 121) were included in the study as a reference group. During the intervention time of seven months the experimental group received a total of 20 training hours of 45 minutes each. Training hours were embedded into the weekly vocational classes, which means there was no difference in the overall learning time between the experimental and the control group. The training was conducted by university trainee teachers who were responsible for three to four apprentices each. Before the intervention started, the trainee teachers attended several preparation sessions, where they got to know about the training concept and were provided with all necessary training material. In this first BEST-Study each training session was divided into two parts: In the first part the focus is on the diagnosis of the apprentices' individual abilities. For this purpose, they are each given a complex professional task to solve independently. Afterwards, each student presents his or her individual solution to the group. In order to stimulate this process, retrospective think aloud (cf. Ericsson & Simon, 1980) is triggered by the trainer. Precise questions on the steps used in the student's solution not only raise the apprentices' metacognitive awareness but also provide valuable information on their individual strengths and weaknesses. The second part of the session is used for the actual strategy training. Here the students analyse the different steps that have to be taken to solve the problem. After that, the apprentices describe the task-specific (cognitive) strategy underlying the problem and note it down in their personal "strategy notebook". General problem-solving (metacognitive) strategies are also reflected at this point. At the end of each session the apprentices are asked to work on a task similar to the one they have just accomplished. This period of practice is supported by the trainer who, following the theory of cognitive apprenticeship (cf. Collins, Brown & Newman, 1989), takes over the role of the expert or master and helps to raise the apprentices' awareness of strategy use (for a more detailed description of the training, see Petsch, Norwig & Nickolaus, 2011, or Norwig, Petsch & Nickolaus, 2010).

BEST-Study I had two main objectives that based upon an accurate diagnosis: (1) to evaluate the effectiveness of the training, and (2) to gain more insight into the apprentices' actual abilities. For the evaluation of the training, longitudinal data on the apprentices' professional competence had to be collected. We developed a paper-and-pencil test comprising items on basic professional knowledge and items on the apprentices' professional problem-solving skills. The distinction between these two aspects was important because the emphasis in the training was on professional problem-solving rather than on acquiring professional knowledge. Overall this new test proved to be a reliable instrument and provided valuable information on the apprentices' strengths and weaknesses. Cross-sectional data was collected on the apprentices' general cognitive abilities and/or IQ (CFT-20 R, Weiss, 2006)[2], their numeracy skills (a selection of closed items from SL-HAM 10/11, Behörde für Bildung und Sport, 2002), their occupational interest (FSI-questionnaire, Schiefele, Krapp, Wild & Winteler, 1993) and their motivation in class (based on a questionnaire developed by Prenzel, Kristen, Dengler, Ettle & Beer, 1996).[3] The data collected provided detailed information on the apprentices' abilities and motivation

at the beginning of their apprenticeship: Consistent with the assumptions made, the group of bricklayers, plasterers and tilers appears disadvantaged in almost all respects when compared with the reference group of carpenters and architectural drafters. They not only have significantly lower cognitive abilities (being at about 93 points well below the average of the population) but also performed much worse in the numeracy test. Even though the test tasks were based on the curriculum of the ninth year of general secondary school (*Hauptschule*), they only solved 40% of the tasks.[4] This was less than expected, especially when taking into account that about 85% of the group had graduated from this school type and that another 12% had even completed intermediate secondary school. The results achieved in the professional competence test were also significantly lower than those of the reference group. As expected, the bricklayers, plasterers and tilers had rather low prior knowledge and made quite few attempts to solve the more complex problem-based professional tasks. Despite their low achievements their motivation in class and their occupational interest at the beginning of the apprenticeship was rather high and comparable to that of the reference group.

The longitudinal data on professional competence shows that the BEST-Training fulfilled its primary goals: Over the period of the training, the competence development of the apprentices in the experimental group was significantly better than in the direct control group (partial $\eta^2 = .073$/ $p = 0.032$). On top of that, the experimental group performed exceedingly well in solving the problem-based professional tasks. The (former) low-achievers even reached the level of the reference group at the end of the training. This is the more surprising since the latter had (on average) significantly higher cognitive abilities and better numeracy skills. Detailed analyses of the students' answers and explanations revealed that the experimental group had improved especially in two respects (see Figure 1): (1) they worked on many more tasks than the control group and solved more of these correctly, and (2) unlike their peers they often provided adequate ideas for the solution of the problem.[5]

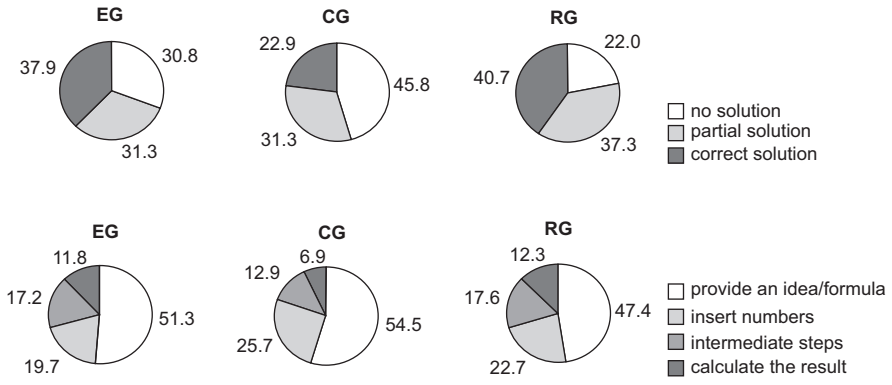

Figure 1. Solution of problem-based professional tasks (above) and types of errors (below).

After the training period, i.e. during the three months to the end of the school year, the students in the experimental group showed a divergent development. While the experimental students with higher cognitive abilities (IQ > 92.2 points) continued to show considerable learning gains, no further development was observed for the experimental students with the lower cognitive abilities (IQ ≤ 92.2 points), who obviously need continuous support and training (for detailed results, see Norwig, Petsch & Nickolaus 2010, and Petsch, Norwig & Nickolaus 2011).

The results from BEST-Study I were very valuable both from the apprentices' and the researcher's point of view. On the one hand, the BEST-Training provided effective support for the apprentices' professional competence development. On the other hand, because of the diagnostic results we gained better and more detailed knowledge of the typical problems and barriers that the lower achievers struggle with.

BEST-Study II

The success of the training program gave rise to the idea that it should be delivered in more classes and should be changed in such a way that a regular use in school (considering the available resources) would become possible. Therefore we conducted a second, larger intervention study (N = 354), which ran from the beginning of 2010 to the end of 2011 (BEST II).[6] Generally, the research design was very similar to the one applied in the first study. The number of classes in the experimental group was increased to five classes of bricklayers, plasterers and tilers (N = 80). Six classes of the same occupations were included as direct control group (N = 130), another six classes of carpenters formed the reference group of higher achieving building trade apprentices (N = 144). Based on the findings of the first BEST-Study, the intervention time was extended to nine months and thus covered the whole school year. The number of training sessions increased to 36 sessions and the duration of each training session was extended to 90 minutes. In consequence, the overall training time was significantly longer than in the first study. At the same time the size of the training groups had to be increased: In order to make the training available for more apprentices and classes, the training was no longer conducted by university trainee teachers but by regular vocational teachers, each of whom took care of half a class of students (which means a maximum of 14 students per teacher). It was feasible to split the classes in halves because the training took place during the two weekly hours that are generally set aside for additional tuition in smaller groups or split classes (so-called *Stützunterricht*). To make the training a regular part of the timetable was an important step towards the more widespread implementation of the training. In addition, it helped to raise further the importance of the training both from the students' and the teachers' point of view.

Training Structure and Material Since the organizational framework of the training underwent several important changes, it became necessary to adapt the training and its structure accordingly. The first step was to structure the training program into

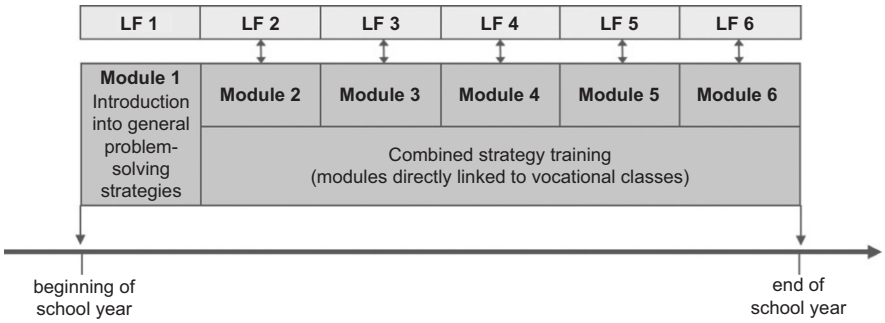

Figure 2. Basic structure of the BEST-Training (BEST II).

six successive themed segments or "modules" which, except for the first module, follow the basic content structure of the corresponding "learning fields" (*Lernfelder*) (see Figure 2). For each of the modules, we developed extensive learning material that serves as a guideline for the training and provides additional individual support that partly compensates for the larger groups of up to 14 students.

The first module (Module 1) focuses on general problem-solving strategies only. The aim of this module is that students understand what systematic problem-solving is and why it is important to plan, monitor and evaluate problem-solving processes. The students are also introduced to the specific problem-solving strategies that were selected for the training.[7] By working on the learning material provided they learn step-by-step to apply these strategies to simple and overall less challenging tasks.

The following modules 2 to 6 are then directly linked to the vocational classes, i.e. here the combined training of cognitive (domain-specific) and metacognitive (general) strategies takes place. The aim of these modules is, on the one hand, that the students learn and practice some of the most important domain-specific strategies for independently solving professional tasks. While working on the tasks, on the other hand, the students are continuously stimulated to apply and consolidate the general problem-solving strategies that they have learnt in the first module. At the start of each module the students receive a personal copy of a workbook which includes the learning material for the respective module. In order to encourage the apprentices' motivation for the training, each of the five modules has an overarching theme that corresponds to the contents of the respective learning field. The theme embraces a small hypothetical construction project which provides the framework for the actual tasks that the apprentices have to solve (module 2, for example, deals with the topic of building foundations; the apprentices become familiar with the position, size and volume of the foundations of a school building).

All five (domain-specific) modules and work books have a common structure which comprises three different phases:

In a first step, the apprentices read a short text and carefully look at the plans that describe the (hypothetical) construction project. Supported by the teacher, the

students solve some easier tasks all together, providing an overview of the module theme.

The main focus of the combined strategy training is on the second phase: Here the students work independently on at least two complex professional tasks. According to curricular indications and expert statements these can be considered as the main learning objectives of the respective learning field. The students work independently, which has the advantage that they can proceed at their own learning speed and can actively tackle their individual problems. The disadvantage is that it is often quite unusual and very challenging for the lower achievers to work independently. This means that they can hardly manage without additional external assistance. It can be assumed that the trainer is not able to simultaneously provide individual support for up to 14 apprentices. Therefore, additional supporting material was developed that aims at helping the students to cross the thresholds that they may encounter during their problem-solving process. Three types of support material exist, which can be arranged in ascending order (in respect to the extent of help given to the students): (1) "impulse cards" (*Impulskarten*) provide short and simple hints about how to continue with the task or where to look for further information; (2) "basic sheets" (*Grundlagenblätter*) elaborate on mathematical or technical fundamentals and explain the basic aspects in simple words and easy to read drawings and sketches; (3) exercise papers (Übungsblätter) offer the possibility to apply what was explained in the basic sheets to several short exercises of very low complexity. Higher achievers are provided with so-called "pro-tasks" (*Profiaufgaben*), which are more challenging theme-related tasks of higher complexity or difficulty. All additional material is available for individual choice, i.e. differentiations can be made between lower and higher achievers alike.

The development of the additional material relied heavily on the diagnostic results and the knowledge we gathered about the apprentices' specific strengths and weaknesses during BEST-Study I. Our findings helped us to anticipate which of the steps in the problem-solving process might become a barrier for this group and enabled us to provide quite accurate help. As a result, the teachers can dedicate most of their time to the students with extra needs. Individual diagnostics and support can be seen as the teachers' main activity during the training and is basically performed as follows: In order to find out about the students' individual barriers or problems, teachers are instructed to use the retrospective thinking aloud method (cf. Ericsson & Simon, 1980). Retrospective thinking aloud is triggered by specific questions (like "What was the first thing you did?") and has proven to be a valuable diagnostic tool when working with lower-achieving building trade apprentices (see Kunz, 2011): It is often quite surprising why a student is not able to solve a task, as the following excerpt from Kunz (2011) illustrates:

> Teacher: What made you think that 240 has to be written above and 98 has to be written below the fraction bar?

> Student: The higher [number] has to be above. [...] Otherwise we end up in negative numbers and we will not get a sensible result.

It becomes clear that the knowledge of a student's precise misconception is often indispensable for giving adequate support and providing helpful explanations. On top of that, thinking aloud may even work as a supporting tool itself, as can be seen from the following example (Kunz, 2011):

> Teacher: What was most difficult for you?
>
> Student: How to calculate it. [...] Yes, these 0.8 are the height. [...] Yes, but here 50 is the width; ah, now I think I know how to do it!

The additional support from the teacher should be adaptive to the students' problems and should basically aim at providing "help to help themselves". Small problems can often be sorted out promptly, by simply reminding the student to apply the general problem-solving strategies or to have a look at the supporting material. More deeply rooted problems may require additional explanations or the teacher's demonstration of parts of the task. Methods such as scaffolding, coaching and modeling are well known from the cognitive apprenticeship approach (cf. Collins, Brown & Newman, 1989) and are applied to help the students reach the required expert level. After each complex task that the students complete, the teacher checks the work together with the student. This final check is useful for teacher and student alike. Not only does it help to monitor the student's learning progress, it also offers an additional opportunity for diagnostics (e.g. for using the thinking aloud method) and further adaptive support.

In the third and last phase of the module the students are reunited with their group. Here the hypothetical construction project is brought to an end. Small groups or pairs of students have to work on a final task which often includes motor or creative skills such as model making or designing a poster. This not only provides some variety to the course of the training, but also brings all the tasks that the apprentices have previously worked on to a conclusion.

Evaluation of the Training. In order to evaluate whether the training was as effective as in BEST-Study I, longitudinal data of all three groups (experimental, control and reference group) was collected on the apprentices' professional competence (paper-and-pencil test from BEST I supplemented with some additional tasks on professional knowledge), their numeracy skills (selected items from the RTBS test battery by Hinze & Probst, 2007) and their motivation in class (slightly altered version of the questionnaire that was used in BEST I, based on Prenzel, Kristen, Dengler, Ettle & Beer, 1996). Additionally, we collected some sociocultural data and the students' general cognitive abilities (IQ, CFT-20 R, Weiss, 2006) at the beginning of the school year.

The results regarding the apprentices' starting conditions overall replicate the findings from BEST-Study I: Again, there are noticeable differences between the

rather disadvantaged lower-achieving bricklayers, plasterers and tilers and the higher-achieving carpenters. As we expected, the first group has significantly lower general cognitive abilities and a comparably less advantageous schooling background. Also sociocultural aspects such as a foreign mother tongue or the number of books at home (as an indicator of cultural capital) are less favorable for the lower achievers. While more than 90% of the carpenters speak German as their first language, only about 50% in the other group do. About 20% of the lower achievers state that their families have less than ten books at home; a statement that holds true for only 3% of the carpenters. As the test on numeracy skills that we used in our first study appeared to be too difficult for the students, another test instrument was used, which has proven to be adequate for the level of lower-achieving vocational students (Hinze & Probst, 2007). Nevertheless, the results are similarly alarming: In total the bricklayers, plasterers and tilers solved only about 50% of the tasks, which covered basic arithmetic, conversion of measurement units, the "rule of three", calculation of percentage and basic geometry. As in the previous study, the results achieved in the professional competence test indicate that their level of prior knowledge is also quite low. Interestingly, the gap between them and the higher-achieving carpenters is again noticeably bigger when comparing the problem-solving skills of both groups ($d \geq 1.01$/ $p \leq 0.001$) than when looking at the respective levels of professional knowledge ($d \geq 0.74$/ $p \leq 0.001$). These findings give additional support to the relevance of the BEST-Training and the importance of its main goal, namely to improve the apprentices' professional problem-solving skills.

The longitudinal findings show that this goal was successfully reached: The professional problem-solving skills of the experimental group developed significantly better than those of the direct control group (partial $\eta^2 = 0.073$/ $p = 0.006$).[8] The initial gap between the experimental group and the higher-achieving carpenters was also reduced considerably, even though the lower-achievers did not quite reach the level of the higher performing group this time (see Figure 3). No training effects were observed concerning professional knowledge;[9] over the time the experimental and the control group showed identical development in respect to this competence aspect. The learning gains were even a little higher than in the reference group. At the end of the school year all three groups, on average, could answer more than 60% of the test questions. Even though the training also provided support of basic numeracy skills, no development and no treatment effect could be observed in the data of the numeracy skills test.[10] In fact, none of the three groups showed remarkable learning gains; they were all quite stable on their respective levels (see Figure 3).

The findings show that the BEST-Training is by no means a general remedy for all the disadvantages that the lower achievers have to struggle with. However, it becomes apparent that the combined training of cognitive (professional) and metacognitive (general) strategies is a powerful tool for promoting and enhancing professional competence. The apprentices are effectively enabled to accomplish the problem-based and often complex tasks set in vocational school and (sometime later) in their professional working life.

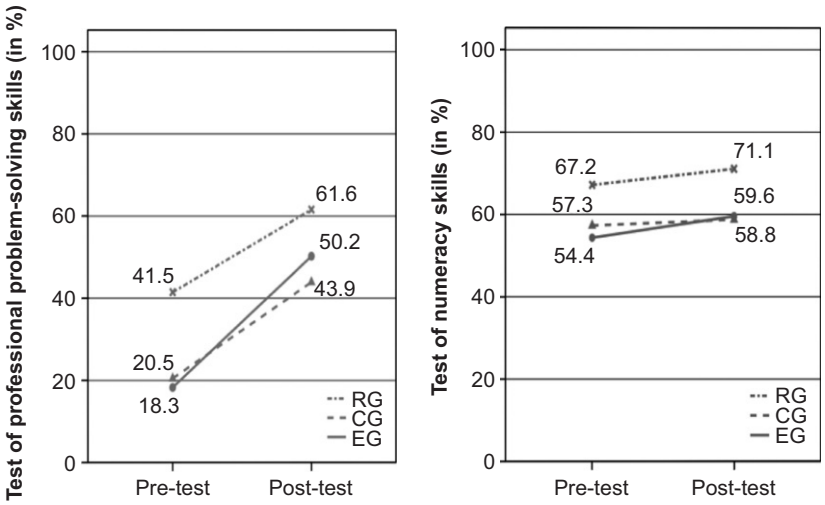

Figure 3. Development of professional problem-solving skills and numeracy skills.

CONCLUSION

Returning to our introductory statements, several important indications can be made: Because of their multiple disadvantages, successful support for lower achievers' professional competence is a difficult issue. It appears impossible to compensate for all their disadvantages in just one year of training. Therefore it is crucial to develop a training that meets their needs best, a training which, despite all disadvantages, has a significant impact on their competence development. Strategy training has proven to be powerful in this respect (see above), but certainly not in all instances (for an overview cf. Tenberg, 2008, for example). This is where the important role of thorough diagnostics comes into play. We have reason to believe that the success of our combined strategy training relies heavily on two factors: (1) Standardized diagnostics in the research process: In order to provide a tailor-made training for the lower-achieving building trade apprentices, profound knowledge about the group's strengths and weaknesses was of great importance. Both training contents (i.e. the selected general and domain-specific strategies) and training material (i.e. the problem-based professional tasks and all additional supporting material) correspond to what we generally found to be the greatest barriers to the apprentices' learning progress. As shown above, our knowledge about these barriers was quite limited at the beginning of our research but was refined and extended with each test that was conducted. All progress made in this respect directly contributed to the changes and adaptations of the BEST-Training and has, from our point of view, all along been the basis for the widespread success of the training. (2) Non-standardized diagnostics during the training: Diagnostics on the group level provided the overall framework for the training. Additionally, a more individual approach had to be taken during

the training. To make sure that each student received the best possible support, it literally became necessary to look into the students' heads, i.e. to get to know their precise misconceptions, and to follow their learning development as closely as possible. We illustrated the value of the thinking aloud method in this respect; it not only helped to discover the individual barriers and misconceptions but was also part of the formative evaluation of the student's learning progress, and thus directly contributed to the training success.

Even though we have reached the end of this particular research cycle, several questions remain unanswered, for example: What level of professional competence do the higher and lower achievers reach at the end of the first year of training? Or to be more precise: Which abilities and skills correspond to the respective levels? What can we say about the empirical dimensions of professional competence in the building sector? Can the BEST-Training be successfully adapted for other domains (with similarly low-achieving apprentices)? These and other questions will be tackled in our next projects.

NOTES

[1] The study was a project within the study programme "Educational Research" commissioned by the Baden-Württemberg Foundation. See http://www.bwstiftung.de/en/education/current-programmes-and-projects/international-affairs-universities/educational-research.html for more information.

[2] German adaptation of Catell's "Culture Fair Intelligence Test – Scale 2" (1960).

[3] For a more detailed description of the test instruments see Norwig, Petsch & Nickolaus (2010).

[4] The reference group also did not perform too well but at least answered 60% of the tasks correctly.

[5] Generally, our detailed analyses showed that characteristics such as task position, text length and professional relevance play an important role for the apprentices' decision whether or not to start working on a task. As expected, the greatest difficulties arose with tasks of higher complexity that required more advanced arithmetic operations (such as the Pythagorean Theorem) or reading of realistic technical drawings, for example.

[6] The second BEST-Study comprised two parts; the first was again part of the study program "Educational Research" commissioned by the Baden-Württemberg Foundation (see http://www.bwstiftung.de/en/education/current-programmes-and-projects/international-affairs-universities/educational-research.html for more information on the programme). The second part of the project was funded by the Robert Bosch Foundation (see http://www.bosch-stiftung.de/content/language2/html/index.asp for more information on the foundation).

[7] In total 16 strategies were selected: seven strategies of planning (read the task carefully, check unknown words, make sure you know what has to be done, think about whether you know how to solve the task, look for help if you do not know what has to be done, highlight all information needed for solving the task, estimate the result), five monitoring strategies (write down what you have done, check for help if needed, check you have copied everything correctly, check intermediate results, check for mistakes and try to correct them) and four evaluation strategies (check if you have completed the task, check final results, memorize your solution, write down what was difficult).

[8] Only experimental (EG, N = 41) and control group (CG, N = 65) are compared here. The values are derived from a repeated measures analysis of covariance (RM-ANCOVA), controlling for numeracy skills, general cognitive abilities and foreign mother tongue. All assumptions of RM-ANCOVA were checked. Scores on the dependent variable are not normally distributed; this assumption is robust if the sample size is large (Pallant, 2005, p. 198), as is the case here. All other assumptions are met by the data.

[9] The results of the RM-ANOVA indicated no treatment effect when comparing experimental (EG, N = 54) and control group (CG, N = 82): partial $\eta^2 = 0.022$/ $p = 0.088$. Scores on the dependent variable are not normally distributed; all other assumptions are met by the data.

[10] The RM-ANOVA showed no significant treatment effect when comparing experimental (EG, N= 54) and control group (CG, N= 78): partial $\eta^2 = .014$/ $p = 0.182$. Scores on the dependent variable are not normally distributed; all other assumptions are met by the data.

REFERENCES

Averweg, A., Schürg, U., Geißel, B., & Nickolaus, R. (2009). Förderungsbedarf im Bereich Mathematik bei Berufsschülern im Berufsfeld Bautechnik. *Die berufsbildende Schule*, *61*(1), 22–28.

Behörde für Bildung und Sport. (2002) (Eds.). *Hamburger Schulleistungstest für zehnte und elfte Klassen - SL-HAM10/11*. Hamburg: Eigendruck.

Bendorf, M. (2005). Förderung von Metakognition und Lernstrategien am Fachgymnasium Wirtschaft. In P. Gonon, F. Klauser, R. Nickolaus, & R. Huisinga (Eds.) *Kompetenz, Kognition und neue Konzepte der beruflichen Bildung*. Wiesbaden: VS Verlag, 203–218.

Bojanowski, A., Eckardt, P., & Ratschinski, G. (2005). Annährung an die Benachteiligtenforschung - Verortung und Strukturierungen. In A. Bojanowski, G. Ratschinski, & P. Straßer (Eds.) *Diesseits vom Abseits. Studien zur beruflichen Benachteiligtenförderung*. Bielefeld: Bertelsmann, 10–41.

Brown, A. L. (1983). Metakognition, Handlungskontrolle, Selbststeuerung und andere, noch geheimnisvollere Mechanismen. In F. E. Weinert, & R. H. Kluwe (Eds.) *Metakognition, Motivation und Lernen*. Stuttgart: Kohlhammer, 80–109.

Bundesinstitut für Berufsbildung. (2011). *Datenreport zum Berufsbildungsbericht 2011: Informationen und Analysen zur Entwicklung der beruflichen Bildung*. Bonn.

Bundesministerium für Bildung und Forschung. (2012). *Berufsbildungsbericht 2012.* Bonn.

Collins, A., Brown, J. S., & Newman, S. E. (1989). Cognitive Apprenticeship: Teaching the Crafts of Reading, Writing, and Mathematics. In L. B. Resnick (Ed.) *Knowing, learning, and instruction.Essays in honor of Robert Glaser*.Hillsdale: Erlbaum Associates, 453–494.

Elke, A. (2007). *Unterrichten zur Förderung von Selbstreguliertem Lernen in der Berufsbildung. Lehrervoraussetzung, Lehrerentwicklung und Perspektiven – eine Interventionsstudie*. Doctoral Dissertation. Universität Basel.

Ericsson, K. A., & Simon, H. A. (1980).Verbal Reports as Data. *Psychological Review*, *87*(3), 215–251.

Hasselhorn, M. (1992). Metakognition und Lernen. In G. Nold (Ed.) *Lernbedingungen und Lernstrategien. Welche Rolle spielen kognitive Verstehensstrukturen?* Tübingen: G. Narr, 35–63.

Hinze, R., & Probst, H. (2007). *Rechentest Berufsschule - RTBS Version 1: Erkennen und Förderung mathematischer Grundkenntnisse beim Berufsschulstart*. Wetzlar: GWABl.

Ivanov, G., & Lehmann, R. (2005). *Mathematische Grundqualifikationen zu Beginn der beruflichen Ausbildung*. Retrieved from http://www.bwpat.de/ausgabe8/ivanov_lehmann_bwpat8.pdf.

Klauer, K. J., & Lauth, G. W. (1997). Lernbehinderungen und Leistungsschwierigkeiten bei Schülern. In F. E. Weinert (Ed.) *Enzyklopädie der Psychologie, D/I/3, Psychologie des Unterrichts und der Schule*. Göttingen: Hogrefe, 701–738.

Kunz, B. (2011). *Fehlkonzepte von Auszubildenden in der Bautechnischen Grundbildung - eine qualitative empirische Studie* (Diplomarbeit). Universität Stuttgart.

Leopold, C. (2009). *Lernstrategien und Textverstehen: Spontaner Einsatz und Förderung von Lernstrategien*. Münster: Waxmann.

Lutz, D. (2007). *Fehleranalyse im Hinblick auf Ansatzpunkte zur Förderung schwächerer Auszubildender des Handwerks* (Diplomarbeit). Universität Stuttgart.

Mähler, C., & Hasselhorn, M. (2001). Lern- und Gedächtnistraining bei Kindern. In K. J. Klauer (Ed.) *Handbuch kognitives Training* (2nd ed.). Göttingen: Hogrefe, 407–429.

Nickolaus, R., & Norwig, K. (2009). Mathematische Kompetenzen von Auszubildenden und ihre Relevanz für die Entwicklung der Fachkompetenz – ein Überblick zum Forschungsstand. In A. Heinze, & M. Grüßing (Eds.) *Mathematiklernen vom Kindergarten bis zum Studium*. Münster: Waxmann, 205–216.

Norwig, K., Petsch, C., & Nickolaus, R. (2010). Förderung lernschwacher Auszubildender - Effekte des berufsbezogenen Strategietrainings (BEST) auf die Entwicklung der bautechnischen Fachkompetenz. *Zeitschrift für Berufs- und Wirtschaftspädagogik (ZBW)*, *106*(2), 220–239.

Nüesch, C., & Metzger, C. (2010). Lernkompetenzen und ihr Zusammenhang mit motivationalen Überzeugungen und Lernleistungen in der kaufmännischen Berufsausbildung. *Zeitschrift für Berufs- und Wirtschaftspädagogik (ZBW)*, *106*(1), 36–51.

Pallant, J. (2005). *SPSS Survival Manual: A step by step guide to data analysis using SPSS for Windows (Version 12)* (2nd ed.). Sydney: Allen & Unwin.

Petsch, C., Norwig, K., & Nickolaus, R. (2011). (Wie) Können Auszubildende aus Fehlern lernen? Eine empirische Interventionsstudie in der Grundstufe Bautechnik. In R. Nickolaus, & G. Pätzold (Eds.) *Zeitschrift für Berufs- und Wirtschaftspädagogik (ZBW), Lehr-Lernforschung in der gewerblich-technischen Berufsbildung,* 129–146.

Prenzel, M., Kristen, A., Dengler, P., Ettle, R., & Beer, T. (1996): Selbstbestimmt motiviertes und interessiertes Lernen in der kaufmännischen Erstausbildung. In K. Beck, & H. Heid (Eds.) *Zeitschrift für Berufs- und Wirtschaftspädagogik (ZBW)*, *Lehr-Lern-Prozesse in der kaufmännischen Erstausbildung. Wissenserwerb, Motivierungsgeschehen und Handlungskompetenzen*, 108–127.

Schiefele, U., Krapp, A., Wild, K.-P., & Winteler, A. (1993). Der „Fragebogen zum Studieninteresse" (FSI). *Diagnostica*, *39*(4), 335–351.

Schreblowski, S., & Hasselhorn, M. (2006). Selbstkontrollstrategien: Planen, Überwachen, Bewerten. In H. Mandl, & H. F. Friedrich (Eds.) *Handbuch Lernstrategien.* Göttingen: Hogrefe, 151–161.

Straka, G. A. (2006). Lernstrategien in Modellen selbstgesteuerten Lernens. In H. Mandl, & H. F. Friedrich (Eds.) *Handbuch Lernstrategien*. Göttingen: Hogrefe, 390–404.

Straßer, P. (2005). Wege zum Verstehen - reflektiertes Lehren und Lernen in der beruflichen Benachteiligtenförderung. In A. Bojanowski, M. Ratschinski, & P. Straßer (Eds.) *Diesseits vom Abseits. Studien zur beruflichen Benachteiligtenförderung*. Bielefeld: Bertelsmann, 85–111.

Tenberg, R. (2008). Lernstrategien von Auszubildenden: Der komplexe Schlüssel zum selbstregulierten Lernen. In R. Nickolaus, & H. Schanz (Eds.) *Diskussion Berufsbildung: Vol. 9. Didaktik der gewerblich-technischen Berufsbildung. Konzeptionelle Entwürfe und empirische Befunde*. Baltmannsweiler: Schneider Verl. Hohengehren, 61–85.

Tiaden, C. (2006). *Selbstreguliertes Lernen in der Berufsbildung: Lernstrategien messen und fördern*. Basel: Universitätsbibliothek.

Weiß, R. H. (2006). *CFT 20-R: Grundintelligenztest Skala 2 - Revision*. Göttingen: Hogrefe.

Wuttke, E. (1998). *Motivation und Lernstrategien in einer selbstorganisationsoffenen Lernumgebung: Eine empirische Untersuchung bei Industriekaufleuten*. Frankfurt: Peter Lang.

Wuttke, E. (2000). Lernstrategien im Lernprozess. Analysemethode, Strategieeinsatz und Auswirkungen auf den Lernerfolg. *Zeitschrift für Erziehungswissenschaft*, *3*(1), 97–110.

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CHAPTER IV

DIAGNOSTICS AND ASSESSMENT IN VET

ANDREAS FREY & JEAN-JACQUES RUPPERT

STRUCTURING AND DETECTING COMPETENCE

The issue of competence and how to evaluate it in children, adolescents or young adults in kindergartens, schools, universities and businesses (see e.g. Breuer, 2002, 2006; Erpenbeck & v. Rosenstiel, 2003; Frey & Ruppert, 2011; Johnson & Schoeni, 2012) and to promote it (see e.g. Brunner, Noack, Scholz & Scholl, 2003; Frey, Schaefer, Knoll & Frey-Eiling, 2002) is very prominent in our societies. This is reflected in countless articles in magazines, in book chapters and monographs, for instance, those listed under the term "competence" in the literature database www.fis-bildung.de (DIPF, 2012). However few empirical studies have dealt with the question of how different competences interconnect and how they can be measured or diagnosed (Breuer, 2005; Frey, 2008; Trautmann, Voelcker-Rehage & Godde, 2011).

That is why this paper focuses on how expertise, social competence, methodological competence and personal competence can be structured and diagnosed in students training to become teachers. After firstly defining competence we will propose a possible structure of competence. We will then look at different methods to diagnose competence before discussing empirically obtained models of competence. Finally we conclude with a brief summary and an outlook to the future.

DEFINING AND STRUCTURING COMPETENCE

When investigating the meaning of the concept of competence, one can either start from the Latin noun *competentia*, translated as "having come/coming together" or "being in charge of" or one may refer to the adjective *competens* in its legal sense i.e. "having the authority to" or "being empowered to". Either way one can interpret competence as "the ability to assume responsibility". Competence can therefore only be attributed to an individual if that person behaves responsibly as regards him/herself as well as his/her environment and if s/he possesses professional abilities. In this configuration the Latin verb *competere*, i.e. "to meet up, to come together, to correspond, to apply, to match", clearly refers to the constitutive factors of the concept of competence: when the demands of a situation "meet up" with the individual bundle of a person's abilities, that person has the "competence" to deal with a given task or problem.

In addition to this exegesis there exist many other definitions of competence in the literature (Bergmann et al., 2000; Schwadorf, 2003) which can be summarized

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 185–198.

as follows: if a person has competence, s/he is able to act in a responsible way as regards him-/herself and others. Such a person then has the competence to act in a way that allows him/her to attain a purpose, to reach a given goal while respecting principles, values and rules that relate to the determining conditions of a particular situation. If you are competent, you are successful and act with reason. Thus competence can be described as a bundle of physical and cognitive abilities required to solve pending problems or tasks in a purposeful and responsible manner, to evaluate alternatives and to develop a personal repertoire of behavioral patterns.

On the whole competences do not constitute independent categories as regards their contents and methods but they are interconnected and cojointly construct the action competence of a person (Frey, 2002; Frey, Balzer & Renold, 2002). Over time and through the structure and the synthesis of different activities, this competence develops into a comprehensive action competence (Kauffeld, 2003). Authors such as Piaget (1972), Oerter (1991), Flammer (1988), Gruber (1997) and Halfpap (1992) share this view as they assume in their respective approaches that a universal sequence of developmental stages is generated through ontological, psychologically organized adjustment processes that lead to flexible, abstract and interconnected knowledge, and finally to action competence. All through one's life one has to acquire knowledge and develop abilities and skills to deal with various tasks and problems. In this evolutionary process at least three distinct developmental levels can be distinguished: on the top level **competence**[1] as a group of advanced abilities, at the intermediary level **ability**[2], a group of highly developed **skills**[3], and finally action as the central organizing activity (see Figure 1).

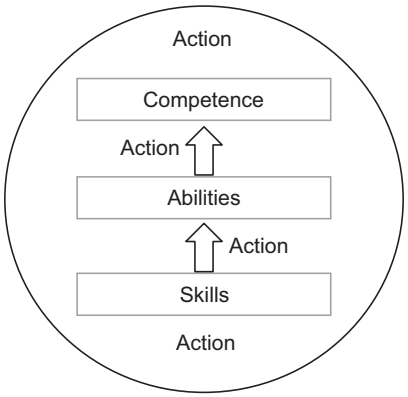

Figure 1. Development of competence, abilities and skills through action.

According to Weinert (2001), an individual has to use different highly developed abilities in order to act competently. These highly developed abilities can be assigned

to expertise, methodological competence, social competence and personal competence. We will now illustrate these four competences using the example of students in teacher training (for more comprehensive information see Frey, 2006).

Expertise in a given field unites different abilities that must be specific to a certain discipline. As these abilities change over time, continuous training is necessary. Without these specific abilities, professional activity is impossible as they provide the individual with the necessary tools for a professional activity. These abilities constitute the specialization of that person. In teacher training Oser (1997, p. 31) calls for twelve abilities, each defined by a number of specific skills; teacher-pupil relationship, monitoring and diagnosing pupils with a view to supporting them, coping with discipline issues, development and promotion of social behavior, passing on learning strategies and accompanying learning processes, designing and methodologically organizing teaching, measuring performance, using teaching media, collaboration at school, school and the public, self-organization competence, general didactic and specific didactic aspects. This list corresponds roughly to the required abilities for the teaching profession as defined by Jäger and Behrens (1994), Hundt (2002) and Terhart (2002) or those of the Teacher Training Academy of the Austrian Federation (2000).

Under *methodological competence* are those abilities that enable a person to think and act within defined boundaries (Frey et al., 2005). This includes an individual's abilities to analyze objects of work, to organize work processes, and to reflect on working conditions and colleagues as well as on individually and socially-effective working relationships, and to extend and modify these abilities as and when necessary. Under methodological competence are frequently listed those abilities with their skills which can be assigned to analytical ability, flexibility, reflexivity, goal-oriented behavior and working techniques (Bader, 2002).

S*ocial competence* includes those abilities that enable a person in a given situation to reach a given goal, primarily in collaboration with others and in a responsible manner. Nevertheless, depending on the situation and the task, it is also important for an individual to achieve that task or parts of it independently. Furthermore, people also need to have conflict resolution and communication abilities when acting as this guarantees that the work is done effectively and efficiently and in a constructive and goal-oriented manner. Thus, the following abilities with their respective skills are usually listed under the heading of social competence; the ability to cooperate, independence, social responsibility, analytical ability, ability to communicate, leadership as well as being able to behave in a manner that is adapted to the situation (Fuhr, 1998; Schuler & Barthelme, 1995; Sloane, 2000).

Personal competence includes skills, attitudes or qualities needed for self-motivated and self-responsible action. Here, those insights that have been acquired over time and that have developed into a *leitmotif* are of particular importance. These are reflected in virtues (*arete* in Greek, *virtus* in Latin; either translated as "excellence" or as "optimal quality") which can also be viewed as fundamental moral attitudes (MacIntyre, 1995; Mieth, 1984). Personal competence is also about action based

upon self-knowledge: there comes a moment of solitude when an idea, a belief or a conviction compels an individual to take a decision alone, a decision that no one else can take in his/her place (Edelstein, Oser & Schuster, 2001; Roth, 1971). The character of a person or his/her attitude to life can be categorized into different concepts. In the relevant literature on virtue and ethics nine concepts can be distilled which can be assigned to the cardinal virtues, the work ethics, the civic virtues or the primary and secondary virtues (Bollnow, 1958; Fuhr, 1998): being helpful and empathic, being calm and patient, being conscientious, pursuing freedom and enjoyment, being proud, being brave and courageous, being "adaptable", being success orientated as well as being curious.

If we expand the graph in Figure 1 so that the four competences, the 34 abilities and the many skills are taken into account, the following hierarchical structural model of competence follows (see Figure 2):

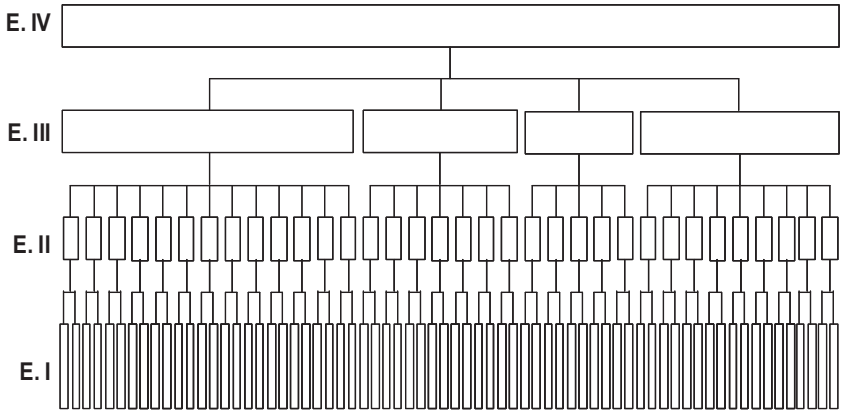

Figure 2. A hierarchical structural model of competence.

According to Krampen (1991), the structuring and acquisition of competence refers to the self-concept of one's own skills, i.e. to the assessment of one's own know-how which is located and measured at level I (E. I) in the hierarchical structural model (examples for specific skills: setting goals independently; communicating in a clear and precise manner). Thus skills constitute indicators that can be structured and measured. On level II (E. II) are bundled those skills which constitute an ability (examples for the bundle of skills in the leadership ability: to recognize the abilities of other individuals, to identify other persons' needs for support, to motivate others to behave responsibly). When results are called for at the competence level, abilities are combined at level III (E. III) as a function of the competence they belong to (abilities that belong to social competence: independence, ability to cooperate, social responsibility, conflict resolution ability, ability to communicate, leadership, being able to behave in a manner that is adapted to the situation). At level IV (E. IV)

we witness a further compression of the four competences (expertise, social competence, methodological competence and personal competence) into what can be labeled a general action competence (see Figure 2).

At this point we can summarize that competence and ability are two theoretical entities that can only be structured and diagnosed on skills. Hence skills are indicators of competence. We will now present a competence model.

DESIGNING A COMPETENCE MODEL

The preceding chapters have illustrated that competence develops through the actions and activities of a person. It could also be shown that the four competence categories are based on ability concepts and that the latter are based on skills concepts. We will now present and empirically test a modified competence model originally developed by Heinrich Roth (1971) in order to demonstrate how these four competence categories are interconnected.

Roth (1971) developed a competence model in which cognitive learning processes lead to expertise and social learning processes lead to social competence. Expertise and social competence, together with moral learning processes, form the precondition for a person's moral maturity to self-determination. The educational goal of maturity will be achieved through the combination of expertise, social and personal competences. When we transform this approach to the development of competence into a modified model of professional competence while taking into account all four competence categories, we end up with following diagram (see Figure 3):

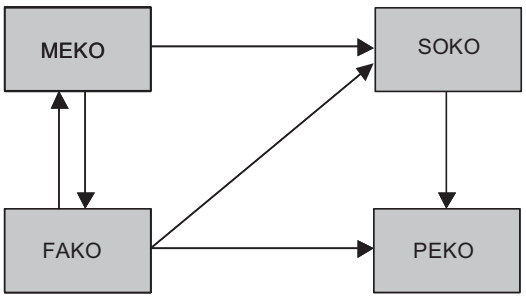

Figure 3. Hypothetical model of professional competence.

Figure 3 shows that expertise (FAKO) corresponds with methodological competence (MEKO) and that both competences are connected to social competence (SOKO). Furthermore, expertise (FAKO) and social competence (SOKO) are structurally linked to personal competence (PEKO). This hypothetical model of professional competence shows that the four competences are part of a network with expertise being of a particular importance as it occupies a central position in this model (see also Frey, 2008).

We now turn our attention to the empirical verification of this hypothetical model of professional competence.

VERIFICATION OF THE PROFESSIONAL COMPETENCE MODEL

Before presenting the results we have to introduce the self-assessment questionnaire (Oser, 2001) that Frey and Balzer (2009) used for the diagnosis of expertise of students in teacher-training.

Data collection was based on the *written survey* method in which a set of fixed skills was assessed regarding their use by the students themselves. The self-assessment questionnaire included 214 skills that belonged to 34 abilities. These abilities could be assigned to the four competence categories of expertise, methodological competence, social competence and personal competence. Each skill (e.g. "to reflect personal knowledge and know-how") was evaluated on a six-point scale ranging from 1 ("I strongly agree") to 6 ("I do not agree at all").

RESULTS

Sample

Data-sets of 891 teacher-training students were taken into account for the following analyses. Of the students who specified their gender, 82 percent were female and 18 percent were male (5 students did not specify their gender). The average age was 23.2 years (SD = 4.2; range 18–58 years). On average the students were in their fourth semester (SD = 3; span of the semesters from 1 to 24). On average they were also rather satisfied with their training (M = 2.72, SD = 0.92; scale ranging from "1 = very satisfied" to "6 = very dissatisfied"). The students also evaluated their career prospects positively (M = 2.60, SD = 0.95; scale ranging from "1 = very good" to "6 = very bad").

Reliability of the Assessment Form

Statements on the reliability of the evaluation form of abilities were determined using *reliability analyses* (Cronbach's a for internal consistency). On the various scales the reliabilities ranged from a = 0.71 to a = 0.94 for group comparison and indicated a satisfactory to very good level of internal consistency of the individual abilities (level II). Finally, the overall coefficients on the level of competence (level III) ranged from a = 0.90 to a = 0.95.

Ranking of Skills into Abilities and Competences

When the 214 skills (indicators) were grouped as a function of their being part of the 34 abilities and these 34 abilities were then bundled into the four competences, the following mean values were obtained (see Table 1):

Table 1. Mean values of the 34 abilities and four competences

Professional abilities	*M*	*SD*
Teacher-pupil relationship	2.05	0.71
Monitoring and diagnosing pupils with a view to support them	2.27	0.76
Dealing with discipline issues and pupils at risk	2.47	0.80
Developing and promoting good social behavior	2.23	0.73
Passing on learning strategies and accompanying learning processes	2.29	0.72
Designing and methodologically organizing teaching	2.33	0.69
Measuring performance	2.48	0.74
Using teaching media	2.19	0.76
Collaborating at school	2.59	0.78
School and the public	2.88	0.99
Self-organization competence of the teacher	2.60	0.77
Specific didactic aspects	2.51	0.71
General didactic aspects	2.16	0.68
Expertise	**2.39**	**0.60**
Social abilities	*M*	*SD*
Independence	2.20	0.64
Ability to cooperate	2.19	0.61
Social responsibility	2.07	0.59
Conflict resolution ability	2.31	0.60
Ability to communicate	2.21	0.55
Leadership	2.45	0.59
Being able to behave in a manner that is adapted to the situation	2.01	0.58
Social competence	**2.21**	**0.49**
Methodological abilities	*M*	*SD*
Reflexivity	2.15	0.67
Analytical ability	2.56	0.62
Flexibility	2.47	0.64
Goal-oriented action	2.34	0.60
Working techniques	2.35	0.60
Methodological competence	**2.38**	**0.53**

(Continued)

Table 1. Continued

Abilities	*M*	*SD*
Being helpful and emphatic	1.64	0.52
Being calm and patient	1.76	0.60
Being conscientious	2.21	0.68
Pursuing freedom and enjoyment	1.88	0.61
Being proud	2.15	0.65
Being brave and courageous	2.96	0.66
Being "adapted"	3.02	0.68
Being success orientated	2.23	0.65
Being curious	2.25	0.62
Personal competence	**2.24**	**0.43**

M = mean; SD = standard deviation; a low value corresponds to high abilities.

The means in Table 1 show that the values of expertise ranged from M = 2.05 (teacher-pupil relationship) to M = 2.88 (school and the public). Within social abilities, the values varied between M = 2.01 (being able to behave in a manner that is adapted to the situation) and M = 2.45 (leadership). The mean values of the methodological abilities ranged from M = 2.15 (reflexivity) to M = 2.56 (analytical ability) and those of the personal abilities from M = 1.64 (being helpful and emphatic) to M = 3.02 (being "adapted").

The mean values of the competence categories were M = 2.21 (social competence), M = 2.24 (personal competence), M = 2.38 (methodological competence) and M = 2.39 (expertise). Using the repeated measures design (Kish, 1987), an ANOVA was carried out which showed that the difference between the mean values of social and personal competences and the methodological competence and expertise were statistically significant ($F = 41.615$, $df = 3$, $p < 0.000$).

Classifying Clusters of Competence

In order to identify students with a similar competence structure, the data obtained were subjected to a non-hierarchical cluster analysis. This technique allowed us to identify in a statistical-inductive manner different types of students who distinguished themselves on the four competences through similar values within a cluster and through dissimilar values between clusters. The analysis focused on three competence clusters, one with highly competent teacher-training students, a second one with students of moderate competence and a third cluster with students of low competence. An optimal separation of the three competence clusters was reached at a value of $p < 0.05$. The means and standard deviations of the obtained competence clusters are shown in Table 2.

Table 2. Means and standard deviations of the three competence clusters

		FAKO	*SOKO*	*MEKO*	*PEKO*
Cluster 1	N	109	109	109	109
	M	3.10	3.29	3.14	3.12
	SD	0.42	0.62	0.39	0.47
Cluster 2	**N**	**397**	**397**	**397**	**397**
	M	2.37	2.58	2.50	2.33
	SD	0.30	0.36	0.33	0.33
Cluster 3	**N**	**385**	**385**	**385**	**385**
	M	1.83	1.93	1.89	1.89
	SD	0.30	0.34	0.34	0.33

FAKO = expertise; SOKO = social competence; MEKO = methodological competence; PEKO = personal competence, cluster 1 = low competence, cluster 2 = moderate competence, cluster 3 = high competence; a low value corresponds to high abilities in a given competence.

The results in Table 2 show that the 891 students could be classified in the three competence clusters of low, moderate and high competence ($p < 0.000$). In cluster 1 there were 109 students (12%) with low competence (range: from M = 3.10 to M = 3.29). In cluster 2 there were 397 students (45%) with moderate competence (range: from M = 2.33 to M = 2.58) and in cluster 3 there were 385 students (43%) with high competence (range: from M = 1.83 to M = 1.93).

Structural Equation Analyses for Testing the Hypothetical Model of Professional Competence within the Three Competence Clusters

Using LISREL 8.50 (Jöreskog & Sörbom, 2001) we investigated whether the hypothetical model of professional competence could be verified with students with high, moderate and low competences. For this purpose the hypothetical model was first tested on students with high competence, then this empirically derived model was applied to students with moderate and low competences.

We expected that with students who had obtained high competence values, the hypothetical model described above could be mapped with the four competences. At the same time we also assumed that the empirical model of structure of the highly competent students could not be replicated with students with moderate or low competences.

Figure 4 shows the empirical model of professional competence for students in cluster 3 (highly competent students):

The result of the structural analysis in Figure 4 ($p = 0.51$, RMSEA = 0.000; GFI = 1.00, AGFI = 0.98) indicated a good model performance. The hypothetical competence model in Figure 3 could be mapped very well (but without a SOKO-PEKO connection): methodological competence (b = 0.35) and expertise (b = 0.17) were

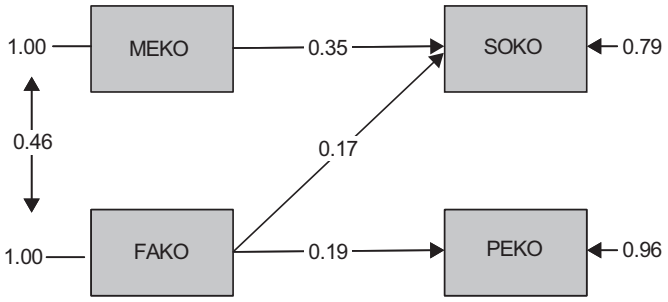

Figure 4. Empirical model of competence of highly competent students. ($\chi^2 = 1.35$; df = 2; p = 0.51; RMSEA = 0.000; GFI = 1.00; AGFI = 0.98. FAKO = expertise; MEKO = methodological competence; SOKO = social competence; PEKO = personal competence.)

structurally connected to social competence with methodological competence and expertise correlating (f = 0.46). In addition, expertise was linked to personal competence (b = 0.19). This empirical model of professional competence demonstrated that the four competences were connected in a network.

The good model performance (p = 0.51) of the highly competent students (Figure 4) could not be replicated neither with students of cluster 1 (students with low competence; p = 0.00) nor with students of cluster 2 (moderately competent students; p = 0.00).

SUMMARY OF RESULTS AND OUTLOOK

On The Reliabilities Of The Self-Evaluation Form

The reliability coefficients for competence analyses at group level indicated sufficient to very good internal consistency of the individual abilities (between a = 0.71 and a = 0.94 at level II) and competences (between a = 0.90 and a = 0.95 at level III).

Thus the subjective ideas of teacher-training students regarding their own skills may be considered as reliable indicators for the diagnosis of competences (Frey, 2006; Krampen, 1991).

On the Ranking of Skills in Abilities and Competences

The mean values of the professional abilities ranged from M = 2.05 for "teacher-student relationship" to M = 2.88 for "school and the public". Within social abilities the mean values varied from M = 2.01 "being able to behave in a manner that is adapted to the situation" to M = 2.45 for "leadership". The mean values for methodological abilities were M = 2.15 for "reflexivity" and M = 2.56 for "analytical ability". The mean values for personal abilities varied from M = 1.64 for "being helpful and emphatic" to M = 3.02 for "being 'adapted'".

The mean values of the competences were M = 2.21 (social competence), M = 2.24 (personal competence), M = 2.38 (methodological competence) and M = 2.39 (expertise). An ANOVA demonstrated that the mean values for social competence and personal competence differed in a statistically significant way ($F = 41.615$, $df = 3$, $p < 0.000$) from methodological competence and expertise.

This result suggests that social and personal competences can apparently be developed easier or faster than methodological competence and expertise whose acquisition requires more time and effort (Frey, 2008; Oser & Oelkers, 2001; Terhart, 2002).

On the Classifying of Clusters of Competence

A cluster analysis revealed that the 891 students were divided into three competence clusters that could be described as of low, moderate and high competence ($p < 0.000$): in cluster 1 there were 109 students (12%) with low competence (range: from M = 3.10 to M = 3.29), in cluster 2 there were 397 students (45%) with moderate competence (range: from M = 2:33 to M = 2.58), and in cluster 3 there were 385 students (43%) with high competence (range: from M = 1.83 to M = 1.93).

This result reiterates that up to the end of the first phase of teacher training, about every eighth student still had substantial learning and competence development to do and about every second student still had some learning and competence development to achieve before becoming a (competent) new teacher (Oser & Oelkers, 2001; Terhart, 2002). Therefore we believe it to be of the utmost importance to offer supplementary support measures for those teacher-training students who lag behind in the development of competence.

On the Structural Equation Analyses

Using structural analyses we investigated whether a modified version of Heinrich Roth's (1971) professional competence model could be extracted from the clusters of students with high, moderate and low competences. The hypothetical competence model could be well mapped with the highly competent students. Then we tried to replicate the high competence students' empirical model of competence with the moderate and low competence students. It turned out that the highly competent students' empirical model of competence could not be analyzed either with the moderate or with the low competence students.

Overall, the empirically derived model of professional competence emphasized on one hand that the moderate and low competence students needed more help in teacher training, if a larger number of competent professionals were to move into teaching. On the other hand it seemed that both Roth's theoretical model (1971) and the modified model of professional competence (Figure 4) assumed a networking of competences that was not valid for all of the groups of students. This suggests that beyond offering extra help to those students who still have some catching up to do as regards the development of competence, we may have to fundamentally rethink teacher training.

Finally, the question whether there were other competence models that could be detected empirically for the three groups of students cannot be answered at this point in time.

NOTES

[1] A competence, e.g. social competence, is a theoretical category that unites all abilities of social competence.

[2] An ability, e.g. communication ability, is a theoretical concept that bundles in a purposeful manner all psychological and physical skills needed for communication.

[3] A skill is concrete and defined by its contents; through rehearsal it has become automatic to the extent that it can function even without a high level of consciousness.

REFERENCES

Bader, R. (2002). Handlungsorientierung in der Berufsbildung - variantenreiche Ausprägung. *Die berufsbildende Schule, 54*, 71–73.

Bergmann, B., Fritsch, A., Göpfert, P., Richter, F., Wardanjan, B., & Wilczek, S. (2000). *Kompetenzentwicklung und Berufsarbeit*. Münster: Waxmann.

Bollnow, O. F. (1958). *Wesen und Wandel der Tugenden*. Frankfurt: Ullstein.

Breuer, K. (2002). Evaluation of Authentic Assessment in Vocational Examinations: Approaches within the German Dual System. In K. Breuer, & K. Beck (Eds.) *Are European Vocational Systems up to the Job?* Frankfurt: Peter Lang, 153–166.

Breuer, K. (2005). Berufliche Handlungskompetenz-Aspekte zu einer gültigen Diagnostik in der beruflichen Bildung. *bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 8*, 1–13.

Breuer, K. (2006). Kompetenzdiagnostik in der beruflichen Bildung. *Zeitschrift für Berufs- und Wirtschaftspädagogik*, *102*, 194–210.

Brunner, E. J., Noack, P., Scholz, G., & Scholl, I. (2003). *Diagnose und Intervention in schulischen Handlungsfeldern*. Münster: Waxmann.

DIPF (2012). *FIS Bildung Literaturdatenbank*. Deutsches Institut für Internationale Pädagogische Forschung. Retrieved 28.04.2012, from http://www.fis-bildung.de.

Edelstein, W., Oser, F., & Schuster, P. (Eds.) (2001). *Moralische Erziehung in der Schule*. Weinheim: Beltz.

Erpenbeck, J., & v. Rosenstiel, L. (Eds.) (2003). *Handbuch Kompetenzmessung. Erkennen, verstehen und bewerten von Kompetenzen in der betrieblichen, pädagogischen und psychologischen Praxis*. Stuttgart: Schäffer Poeschel.

Flammer, A. (1988). *Entwicklungstheorien. Psychologische Theorien der menschlichen Entwicklung*. Bern: Huber.

Frey, A. (2002). Berufliche Handlungskompetenz - Kompetenzentwicklung und Kompetenzvorstellungen in der Erzieherinnenausbildung. *Empirische Pädagogik, 16*(2), 139–156.

Frey, A. (2006). Strukturierung und Methoden zur Erfassung von Kompetenz. *Bildung und Erziehung, 59*(2), 125–145.

Frey, A. (2008). *Die Kompetenzstrukturen von Studierenden in der ersten und zweiten Phase der Lehrerbildung - ein nationaler und internationaler Vergleich*. Landau: Empirische Pädagogik.

Frey, A., & Balzer, L. (2009). Prüfen von überfachlichen Kompetenzen. *Folio*, *3*, 18–21.

Frey, A., Balzer, L., & Renold, U. (2002). Kompetenzen in der Grundausbildung. *Panorama, 16*(2), 8–10.

Frey, A., Jäger, R. S., & Renold, U. (2005). *Kompetenzdiagnostik. Sichtweisen und Methoden zur Erfassung und Bewertung von beruflichen Kompetenzen*. Landau: Empirische Pädagogik.

Frey, A., & Ruppert, J.-J. (2011). *Prevention of Dropout in Vocational Training*. Cape Town (SA): PACE.

Frey, K., Schäfer, U., Knoll, M., & Frey-Eiling, A. (2002). *Die Projektmethode. Der Weg zum bildenden Tun*. Weinheim: Beltz.

Fuhr, T. (1998). *Ethik des Erziehens. Pädagogische Handlungsethik und ihre Grundlegung in der elterlichen Erziehung*. Weinheim: Beltz und Deutscher Studienverlag.

Gruber, H. (1997). *Wege zum Können. Determinanten des Kompetenzerwerbs*. Bern: Huber.

Halfpap, K. (1992). *Berufliche Handlungsfähigkeit - Ganzheitliches Lernen - Anforderungen an das Lehr- und Ausbildungspersonal*. In G. Pätzold (Ed.) *Handlungsorientierung in der beruflichen Bildung*. Frankfurt: Verlag der Gesellschaft zur Förderung arbeitsorientierter Forschung und Bildung.

Hundt, D. (2002). *Führungskraft Lehrer. Empfehlungen der Wirtschaft für ein Lehrerleitbild*. Berlin: Bundesvereinigung der Deutschen Arbeitgeberverbände (BDA).

Jäger, R. S., & Behrens, U. (1994). *Weiterentwicklung der Lehrerbildung*. Mainz: von Hase & Koehler.

Johnson, R. C., & Schoeni, R. F. (2012). The Influence of Earli-Life Events on Human Capital, Health Status, and Labor Market Outcomes over the Life Course. *Journal of Economic Analysis & Policy*, *11*, 21–43.

Jöreskog, K. G., & Sörbom, D. (2001). *LISREL 8.50: User´s Reference Guide*. Lincolnwood: Scientific Software International.

Kauffeld, S. (2003). Weiterbildung: Eine lohnende Investition in die berufliche Handlungskompetenz. In A. Frey, R. S. Jäger, & U. Renold (Eds.) *Kompetenzmessung - Sichtweisen und Methoden zur Erfassung und Bewertung von Kompetenzen*. Landau: Empirische Pädagogik, 176–195.

Kish, L. (1987). *Statistical Design for Research*. New York: John Wiley.

Krampen, G. (1991). *Fragebogen zu Kompetenz- und Kontrollüberzeugungen*. Göttingen: Hogrefe.

MacIntyre, A. (1995). *Der Verlust der Tugend: Zur moralischen Krise der Gegenwart*. Frankfurt: Suhrkamp.

Mieth, D. (1984). *Die neuen Tugenden. Ein ethischer Entwurf*. Düsseldorf: Patmos.

Oerter, R. (1991). Entwicklung und Förderung: Angewandte Entwicklungspsychologie. In L. Roth (Ed.) *Pädagogik. Handbuch für Studium und Praxis*. München: Ehrenwirth, 158–171.

Oser, F. (1997). Standards in der Lehrerbildung. Teil 2: Wie werden Standards in der schweizerischen Lehrerbildung erworben? Erste empirische Ergebnisse. *Beiträge zur Lehrerbildung, 15*(2), 210–228.

Oser, F. (2001). Standards: Kompetenzen von Lehrpersonen. In F. Oser, & J. Oelkers (Eds.) *Die Wirksamkeit der Lehrerbildungssysteme.* Zürich: Rüegger, 215–342.

Oser, F., & Oelkers, J. (2001). *Die Wirksamkeit der Lehrerbildungssysteme*. Zürich: Rüegger.

Pädagogische Akademie (2000). *Die Bewertung der Schulpraxis und die Kompetenzen von Lehrern*. Salzburg: Pädagogische Akademie des Bundes.

Piaget, J. (1972). *Psychologie des Erkennens* (Band 3). Stuttgart: Klett.

Roth, H. (1971). *Entwicklung und Erziehung: Grundlagen einer Entwicklungspädagogik*. Hannover: Schroedel.

Schuler, H., & Barthelme, D. (1995). Soziale Kompetenz als berufliche Anforderung. In B. Seyfried (Ed.) *Stolperstein Sozialkompetenz: Was macht es so schwierig, sie zu erfassen, zu fördern und zu beurteilen.* Bielefeld: Bertelsmann, 77–116.

Schwadorf, H. (2003). *Berufliche Handlungskompetenz. Eine theoretische Klärung und empirische Analysen in der dualen Erstausbildung*. Stuttgart: IBW.

Sloane, P. F. E. (2000). Veränderung der Betriebs- und Arbeitsorganisation. Konsequenzen für die betriebliche Bildungsarbeit. In BIBB (Ed.), *Lernen, Wissensmanagement und berufliche Bildung*. Bielefeld: Bertelsmann, 93–109.

Terhart, E. (2002). *Standards für die Lehrerbildung. Eine Expertise für die Kultusministerkonferenz* (ZKL-Texte Nr. 24). Münster: Universität.

Trautmann, M., Voelcker-Rehage, C., & Godde, B. (2011). Fit between workers' competencies and job demands as predictor for job performance over the work career. *Journal for labour Market Research*, *44*, 339–347.

Weinert, F. E. (2001). Concept of Competence: A Conceptual Clarification. In D. S. Rychen, & L. H. Salganik (Eds.) *Defining and Selecting Key Competencies*. Seattle: Hogrefe & Huber, 45–65.

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NON-COGNITIVE FACETS OF COMPETENCE

Theoretical Foundations and Implications for Measurement

INTRODUCTION

There is a growing interest in the definition and assessment of competence. Particularly in the context of vocational education and training it is vital to have reliable and valid information about individual competences. Despite its long tradition, student testing has increasingly been criticized in the United States, while there are several reasons for the current interest in this topic in Europe. Firstly, competence measurement gained recognition through the use of large-scale international assessments such as PISA, TIMSS etc. Secondly, in order to evaluate and compare the performance of educational units (schools, school types, districts, states etc.) and the effects of educational policy, testing students for their competence has become the criterion of choice. Thirdly, assessing competence might serve as a means of recognizing informal learning, for example, within the remit of the European Qualification Framework (EQF).

Though there is no broadly accepted definition of competence, the most common definitions build on Chomsky's distinction between competence and performance (Chomsky, 1965). Hence, competence is defined as a latent construct that is only observable in performance within the respective real-life domain. Thus, defining competences usually begins with the identification of typical demands in real-life situations. In turn, typical bundles of such situations are usually referred to as domains and are generally defined by practitioners of the respective practical context (Achtenhagen, 2007; Klieme et al., 2003; Lehmann & Seeber, 2007; Sloane, 2008; Winther, 2010). As a consequence, a common definition of competence derives from the DeSeCo initiative (Definition and Selection of Competencies) and refers to the widespread functional approach: "A competence is defined as the ability to successfully meet complex demands in a particular context through the mobilisation of psychosocial prerequisites" (Rychen & Salganik, 2003, p. 43). Furthermore, according to Weinert (2001), besides intellectual abilities, content-specific knowledge, cognitive skills, domain-specific strategies, routines and subroutines, competences are also comprised of "… motivational tendencies, volitional control systems, personal value orientations, and social behaviours" (Weinert, 2001, p. 51). Following Spencer, McClelland and Spencer (1994, p. 6) "any individual characteristic that can be reliably measured, counted and that can be shown to differentiate superior from average

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 199–212.

performers" is part of competence.[1] Within such broad definitions, competences cannot be clearly separated from personality traits, but there are smooth transitions (Corsten, 2001). Consequently, Erpenbeck and von Rosenstiel (2003) define competences as dispositions allowing for self-organized thinking and acting, while dispositions are defined as the individual prerequisites of action regulation. Attributing the particular extent of competence in an individual points to the prognosis (explained variance) of that person's future performance in complex domain-specific real-life situations, i.e. problem solving. Thus, whatever individual prerequisites contribute to this prognosis of future action, regulation should be considered as a possible part of competence. Whereas manifest performance might cursorily take the form of an unidimensional – in some cases even dichotomous – variable, the underlying competence, however, is multifaceted with regard to its subsurface structure. We subscribe to the view that competence is not an unidimensional construct but comprises multiple facets of individual dispositions (see also Breuer, 2006). However, most empirical studies merely focus on cognitive facets of competence, while non-cognitive facets, such as motivation and emotion, for several reasons, are widely neglected. In the present paper, we will emphasize the significance of non-cognitive facets of competence based on action regulation theories and discuss resulting implications for the investigation of competence. To date there are various approaches in dealing with emotional and motivational facets in modeling and measuring competences, which will be briefly outlined. An integrated approach will be considered for its implications for test designs.

NON-COGNITIVE FACETS ON VARIOUS ONTOGENETIC LEVELS

Without question, cognitive facets such as knowledge and general intellectual abilities are needed for competent action (Rychen & Salganik, 2003, p. 45). However, common psychological theories of action regulation also stress non-cognitive processes in perceiving and judging situations, elaborating action opportunities, decision making, and monitoring of action regulation. In general, "humans are built to respond to the things that matter, and the way humans do it is by emotion" (Ellsworth, 1994, p. 150). Hence, knowing is a necessary, but not sufficient, prerequisite of competent action. Furthermore, the acquisition of knowledge of any kind is also reliant on non-cognitive processes (Dörner & Kaminski, 1988; Kuhl, 2001; Rausch et al., 2010; Rausch, 2011; Ruiz-Primo, 2009; Sembill, 1992, 1995, 2010; Schumacher, 2002; von Cranach & Bangerter, 2000; Wuttke, 1999).

Further support for the significance of affective evaluations in action regulation, as well as a deeper insight into the functioning of unconscious and conscious processing, are derived from neuroscience (Baer, Connors & Paradiso, 2009; Birbaumer & Schmidt, 2010; Damasio, 1995; LeDoux, 1994; Panksepp, 1998; Sembill, 2010): An evolutionary view of the functions of non-cognitive facets in action regulation underlines the power of neurophysiological principles in learning, reflecting and acting. It enables a better understanding of the sustainable growth of human beings

as well as similarities and differences to animals. When studying human behavior, it is necessary to differentiate between various ontogenetic levels such as *organ level* (e.g. brain, stomach, heart, kidney etc.), *individual level* (e.g. resources, dispositions, competences, world views etc.) and *social/group level* (e.g. acceptance, performance, responsibility etc.). However, findings obtained from different levels must not be mixed up: For example, one can neither draw precise conclusions on an individual's competence on the individual level nor predict the respective performance on the social/group level, only by observing neurophysiological processes inside the brain. Performance is based on knowledge, dispositions and competences, which, in turn, are based on acquired, stored and remembered information.

But where does the respective information come from? It is evaluated data (e.g. light, acoustic and compression waves), which are decoded and replaced by nervous and endocrine activity. The evaluation is directed to basic survival instincts and associated instincts to maintain one's orientation and behavioral safety. On an organ level these evaluations are implemented by the so-called limbic and endocrine systems, whereas the processes remain unconscious. In the following, we refer to these evaluations in terms of *affect*. If these processes become conscious on an individual level, the respective outcomes are referred to as *emotions* and *motivation*, which can now be reflected on as well as communicated on a social level. The social level, again, contains all elements and sub-processes of its emergence on lower ontogenetic levels. Similarly, knowledge, dispositions, and competences on the individual level contain all the elements and sub processes derived from their emergence on lower ontogenetic levels. One should be aware of the significance of processes on all levels for human action.

In the following, we focus on the interplay of cognition and affect within action regulation on the individual, psychological level. In doing so, we adopt an analytical perspective, while recognizing that cognition and affect are basically inseparable. We define affects as unconscious evaluative reactions to internal and external stimuli (implemented by the limbic and endocrine systems; see above). This perspective is in line with common appraisal theories, which propose an ongoing scanning of the environment with regard to the relevance for one's own needs, beliefs, values, norms, standards etc. (Lazarus, Kanner & Folkman, 1980 et passim; Scherer, 1981 et passim; Smith & Kirby, 2000 et passim). According to the appraisal theory proposed by Scherer and colleagues, continual unconscious stimulus evaluation checks (SEC) are considered to check every internal and external stimulus with regard to the following criteria: (1) novelty (unexpectedness), (2) intrinsic pleasantness (derived positive or negative evaluations), (3) goal/need significance (related to basic needs, motives, intentions, and goals), (4) coping potential (confidence in one's own ability to handle the situation), and (5) standards (moral evaluation of main and side effects) (Leventhal & Scherer, 1987; Scherer, 1981, 1999).

Whenever these affects exceed a critical threshold the respective contents under evaluation become conscious and distinct emotions may arise (bottom-up). Conscious processing, in turn, influences unconscious associative processing, i.e.

affective evaluations. Hence, whatever cognitive content is part of working memory in a particular moment determines for the future which subsequent stimuli are more likely to attract attention by priming (van Reekum & Scherer, 1997, p. 279; see also Aebli's notion of *intake*, Aebli, 1980). As working memory, i.e. conscious processing, is rather slow, requires a lot of energy and is limited in capacity, unconscious processing in terms of routines and patterns are preferred whenever available (Birbaumer & Schmidt, 2010; Gadenne, 1996). In turn, affective evaluations are required "... for the sake of signalling states of the world that have to be responded to" (Frijda, 1988, p. 354; see also *affect as information*-approach: Clore, 1994; Schwarz, 1990; Storbeck & Clore 2008, pp. 1830ff.). States of high arousal, as a consequence of defiant affective evaluation, are likely to trigger emotions, which are mostly defined as conscious, intensive and directed (Kleinginna & Kleinginna, 1981; Kuhl, 2001; Otto, Euler & Mandl, 2000; see Rausch et al., 2010 and Rausch, 2011, for details). Affects and emotions thus serve as a continual feedback on success and failure in need satisfaction and goal achievement and are therefore vital in any processes of problem solving. They enable priority setting and a reduction of complexity as well as the decoupling of stimuli-and-response patterns (Ciompi, 2007; Scherer, 1981, 1994; Sembill, 2003).

As positive emotions – from a functional perspective – serve as a reward for past behavior and negative emotions call for changes in future behavior motivational facets of action regulation are realized in an interaction with affect and cognition as well (Kuhl, 2001; Sembill, 2003). Consequently, Smith and Kirby refer to emotions as a "sophisticated *well-being monitor and guidance system* that serves both attention-regulatory and motivational functions" (Smith & Kirby, 2000, p. 90; see also Carver, Sutton & Scheier, 2000). Any action would be irrelevant without the subjective values of the acting individual (Lewis, 1946), as these influence the perception and evaluation of (potential) goals, courses, and results of action (Emmons 1996; Sembill 1992). "There is no reason, other than an affective one, to prefer any goal whatever over some other. Cognitive reasoning may argue that a particular event could lead to loss of money or health or life, but so what?" (Frijda, 1994, p. 200).

Apart from the physiological needs inherent in all human beings (instincts; see above), there are universal psychological needs as well. According to the Self-Determination Theory (SDT) of motivation proposed by Deci and Ryan (1985; 2002), there are three basic human needs: (1) The need for autonomy, which refers to self-organization and the desire to perceive oneself as the origin of one's action. (2) The need for competence, which means the desire to be effective in one's interactions with the environment and in coping with challenging tasks in order to maintain and develop competences. (3) The need for social relatedness, which refers to the inherent desire to be accepted by other individuals and part of social groups. Though the intensity and the level of consciousness of these needs might differ between individuals, they are said to be present in all human beings. However, besides these basic needs, there are learned motives, interests, and intentions that might differ enormously between individuals but nevertheless are vital for action regulation. Besides,

these traits are largely open to consciousness, both domain-specific and concrete. As they are learned (or in terms of SDT: *internalized*) as a consequence of basic need satisfaction in prior experiences, they are coherent concretions or extensions of basic needs. For instance, habitual interest in a certain domain points to positive prior experiences in that domain. In consequence, stimuli from that domain trigger positive affects potentially resulting in conscious emotions (such as situational interest). To summarize, affects and emotions have a seismographic function in action regulation, which can be explained by neurophysiological findings as well (Schumacher, 2002; Sembill, 2003, 2010).

The extent, to which internalized values have an influence on performance, and thus have to be considered as a facet of competence, may vary with regard to a particular domain. The more a domain is artificially defined (e.g. by a formal curriculum, such as mathematics) instead of being generated by real-life practice, the more it lacks a real-life performance.[2] The performance in a math test should be an estimator for some kind of real-life performance in math, but instead, the test performance itself is the typical performance of that artificial domain. Unsurprisingly, the emotional and motivational facets that influence this performance refer to the typical test situation, such as test anxiety and test motivation, both strongly influenced by the impact of the particular test. These test-related emotions and motivations are neglected as part of mathematical competence, for good reason. On the other hand, domain-related values such as interest in math or preference for mathematical thinking are neglected as well though they might have a huge influence on future "mathematical practice". This neglect derives from a traditional preference for cognitive learning goals over affective ones.

In contrast to the above-mentioned domain of mathematics as a school subject, in working contexts the desired performances are more complex and less predictable. Though distal work goals are predefined by the organization, workplaces allow for varying scopes of action. Apart from differences in cognitive dispositions, within work psychology, the resulting variance of individual engagement is also considered to be caused by constructs such as organizational citizenship behavior (Nerdinger, Blickle & Schaper, 2008), personal initiative (Fay & Frese, 2001) and the idea that, besides formal norms and standards, organizations depend on the non-codified and voluntary engagement of their members (Smith, Organ & Near, 1983). These constructs, in turn, point to an individual's internalized subjective values (Nerdinger, 1995). Hence, we argue that in order to explain performance in real-life work tasks (i.e. modeling and measuring competence), non-cognitive facets should be taken into account in terms of an integrated approach.

NON-COGNITIVE FACETS IN MODELING AND MEASURING COMPETENCE

As mentioned at the beginning, there are several ways of dealing with non-cognitive facets in modeling and measuring competence, ranging from wide neglect to integrated recognition within performance. In order to understand the functionality of

human intentional behavior a boost was given to research and literature on processes of thinking and problem solving as a result of the paradigm shift referred to as the "cognitive turn" which occurred in the middle of the last century. Overcoming the black-box metaphor of the behaviorist perspective, several groundbreaking works appeared, such as Bruner, Goodnow and Austin (1956), Miller, Galanter and Pribram (1960), Chomsky (1965), Newell and Simon (1972) and Neisser (1974) within western psychology, as well as the works of Rubinstein, Vygotski, Galperin, Leont'ev, Oschanin etc. within Soviet psychology (Matthäus, 1988). With regard to Germany, the works of Dörner (1976), Hacker (1978), Scherer (1981) and Aebli (1980) should also be highlighted as exemplary. Already at that time it had become apparent that the grasp of cognition as well as the certain view of the relevance of non-cognitive constructs was considered differently depending on the particular author. For example, Dörner was one of the first researchers to stress the significance of emotions in thinking and problem solving, whereas Aebli considered emotions to be merely disturbing variables.

In most of the international literature, the definition of cognition goes beyond the common definition in German literature. Instead of distinguishing cognition, emotion and motivation on the same level, the definition of cognition is often expanded to cover all internal processes, including emotion and motivation. Nevertheless, many of the early works stress the significance of evaluations, judgements, values, preferences etc. without going into detail. Nowadays the evidence of neurophysiological findings contributes to the overcoming of cognitivist approaches in the narrow sense. The relevance of emotional and motivational facets for understanding competent acting in real-life situations is widely accepted, but rarely investigated empirically. In the previous sections, we emphasized the necessity of broadening the modeling and measurement of competence to integrate non-cognitive facets. Consequently and importantly, it is necessary to translate the basic principles of action regulation theory into a consistent model of competence in a specific domain.

A competence model in the narrow sense merely consists of a definition of a set of individual dispositions. There are neither statements made on what kind of performance is expected to be derived from the respective competence nor does it include reflections on the implications of the domain. In contrast, competence models in a broader sense comprise of a domain model of requirements, a competence model of individual dispositions (i.e. a competence model in the narrow sense), and an empirical model of measurement. Furthermore and most significantly, consistent statements on the relationship of these three model layers are needed because defining and measuring competences always means that some kind of (test) performance serves as an estimator for further (real-life) performances in the respective domain. Consequently, in order to trace test performance back to singular facets of competence, it is necessary to assign particular test behavior to particular facets of competence. Otherwise, it would remain unclear which facets of competence produced the test performance or, in other words, a singular test score would conflict with a multifaceted construct.

As a result, developing integrated measurements for a multifaceted construct in order to analyse test behavior regarding the particular facets raises the question: Which test behavior points to which facet of competence and to what extent? This problem of translation is further aggravated as performance is not necessarily a bijective function of the underlying competence (Chomsky, 1965), but may be produced by varying combinations of trait facets. Hence, measuring a multifaceted construct also includes the problem of dealing with certain interrelations and possible effects of compensation between the different conceptualised facets. For example, one could ask whether, within future work situations, a short-term lack of knowledge might be compensated for by interest and engagement? On the other hand, is a competent testee necessarily more interested and contented? Again, this is subject to the perspective of modeling competences in the face of theoretical implications and the underlying grasp of education in general.

Thus, within the investigation of competence, four major ways of handling dimensionality in modelling and measurement may be distinguished (see Figure 1): (A) *Modeling and measuring competence as a unidimensional construct.* This approach implicates an antiquated and simplistic view of human behavior. A narrow perspective on capabilities often corresponds with a narrow domain of application or an otherwise mediocre prognosis of performance. (B) *Modeling competence as a fragmented construct and disregarding non-cognitive facets in measurement*. This approach does not explicitly neglect the meaning of non-cognitive facets, but nevertheless, it does not include them in its measurements. This approach is preferred, for example, within the current priority research program of the German Research Foundation entitled "Competence Models for Assessing Individual Learning Outcomes and Evaluating Educational Processes" (Klieme & Leutner, 2006; Hartig, Klieme & Leutner, 2008 et passim).

The program, so far, provides a lot of interesting findings, which, however, are based on the assumption of the outstanding significance of cognitive parameters in competent acting, while non-cognitive facets are not included as a focus of attention. (C) *Modeling competence as a multifaceted construct and measuring non-cognitive facets as separated from cognitive facets*. An example of this approach can be found in the modeling of professional competences of teachers within the study "COACTIV" initiated by Baumert and colleagues (Baumert & Kunter, 2006; Kunter et al., 2007; Kunter & Klusmann, 2009). Non-cognitive facets such as attitudes are measured by self-report questionnaires that remain separated from the actual performance context. Therefore, the influence of these facets on solving domain-specific problems might be underestimated.

Nevertheless, the results might show interrelations between cognitive and non-cognitive traits on a general level. A similar approach is posed in the feasibility study of a large-scale assessment within VET (Baethge et al., 2006). (D) *Modeling competence as a multifaceted construct and measuring cognitive and non-cognitive facets integrated*. This approach is rarely applied and is limited to laboratory studies. However, we have striven to implement it within our current study[3] because it is

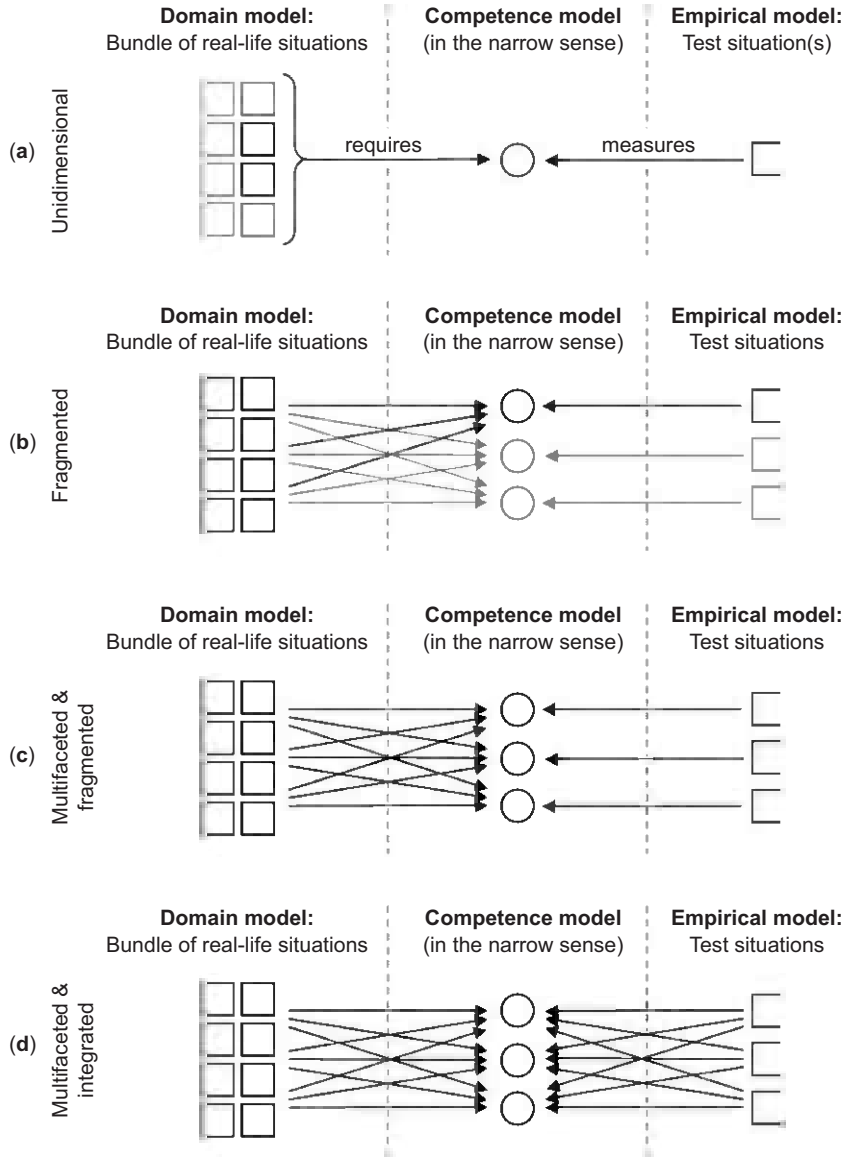

Figure 1. Types of competence models (in the broader sense).

more in line with theories of action regulation and, therefore, to our mind, promising with regard to ecological validity. Nevertheless it also raises several methodological questions, some of which will be provisionally addressed in the following section, however, without providing an exclusive solution yet.

PROSPECTS FOR AN INTEGRATED MEASUREMENT OF COMPETENCE

A multifaceted model and integrated measurement of competence (see model D in Figure 1) demands some very complex inferences. A suitable model would have to provide detailed explanations for (i) which step in which real-life situation requires which competence facet and (ii) which step of a test situation measures which competence facet. Furthermore, (iii) it would have to consider the probability of compensation between the facets. Given the complexity, dynamics, and interaction of prerequisites, processes, and products of thinking, problem solving, and acting (see above), neither current analytic frameworks nor empirical methods seem to meet the necessary requirements.

Common approaches of competence measurement pose a more or less complex problem to the testees and assess the result they achieve. There is an exclusive focus on the product, whereas the process of problem solving remains a black box. This is a typical characteristic of mental work, as opposed to physical or practical work, in which the emergence of a product is observable. However, in both contexts, the solution to a problem, to our mind, is not only a product of applied knowledge and skills, but also a result of emotional and motivational processes while applying knowledge and skills. Goal setting, goal commitment, sustained engagement, etc. can hardly be explained by specific knowledge or general cognitive abilities alone. Thus, it is vital to try to open up the black box of problem-solving processes.

In order to gain insight into the process of problem solving, a self-evident method is to question the testees while they are working on the problem. An extreme form of self-reporting would be think-aloud protocols. Though the collected data allows for intensive insights into problem-solving processes, there are at least three reasons against it. Firstly, this method is a heavy intrusion into the respective processes and, thereby, is likely to change the processes (reactivity). Secondly, as a consequence of this, reactance in terms of intentional refusal might result. Thirdly, the analyses of the data collected call for extensive work. Large scale assessments are confronted with the problem in a particular way as the empirical analysis of a huge number of data sets requires efficient and streamlined procedures. Thus, methods applied to unveil problem solving should be as subtle as possible. Prompts for providing information into the current state of the problem-solving process should be embedded into the problem situation, thereby concealing the perception of it as an artificial add-on. Nevertheless, there are several uncertainties related to those prompts. At first, the ability to give adequate self-reports might be limited and is likely to vary individually. In addition, a desired feature of testing is that the testee can manipulate the results only in one direction, namely downwards. When using self-reports for high-stake testing, this becomes a problem because the likelihood of manipulation increases. Embedding prompts into the authentic problem scenario might also help decrease manipulation.

Furthermore, the problem situations should be as authentic as possible, not only with regard to the knowledge and skills required in real life, but also with regard to

possible effects of non-cognitive factors. For example, in working contexts there is often the possibility to fix a problem only on the surface without turning towards its deeper sources. Moreover, there are sometimes possibilities to completely ignore or delegate problems, especially if there is still other (more attractive) work to do. Test situations should represent such characteristics in order to make the effects of non-cognitive influences more visible.

At present, a predefined competence model providing well founded hypotheses on all possible interactions and compensations of various facets of competence (as stated in model D within Figure 1) seems to be some distance away. Nevertheless developing item formats and test items with respect to a variety of competence facets provide possibilities for confirming such facets and, thereby, advancing the theoretical debate.

To summarize, an integrated modeling and measurement of cognitive and non-cognitive facets is a worthwhile but, at the same time, a challenging task. One could argue whether a bijective mapping between single facets of test behavior and single facets of underlying competence, as proposed in the integrated approach (D), is feasible at all for the distinction between cognition and affect remains artificial. Moreover, as we know from Aristotle, the whole is more than the sum of its parts but is something else. Nevertheless, we have here introduced initial considerations as to how to overcome this dilemma by applying a less rigorous modeling approach. In the long run, pursuing holistic approaches to competence measurement might help to direct attention to what are currently neglected non-cognitive goals of vocational education.

NOTES

[1] Some authors refer to such broad understandings in terms of competency, as opposed to competence as a more narrow, merely functional perspective (Delamare-Le Deist & Winterton, 2005). However, we do not adopt this distinction.

[2] Therefore, one could argue whether "domains" such as math as a school subject are still in line with the definition of a domain.

[3] "Domain-specific Problem Solving Competence of Industrial Administrators in Training" (DomPL-IK) is a joint research project of the universities of Bamberg, Mannheim, Frankfurt and Bremen and the German Institute for International Educational Research (DIPF), which is a part of the Ascot program founded by the German Ministry of Education and Research. It aims at technology-based assessment of problem solving competences of apprentices becoming industrial clerks (*Industriekaufleute*, IK) within the domain of control.

REFERENCES

Achtenhagen, F. (2007). Wirtschaftspädagogische Forschung zur beruflichen Kompetenzentwicklung. In J. van Buer, & C. Wagner (Eds.) *Qualität von Schule - Ein kritisches Handbuch*. Frankfurt: Peter Lang, 481–494.

Aebli, H. (1980). *Denken: das Ordnen des Tuns. Band I, Kognitive Aspekte der Handlungstheorie*. Stuttgart: Klett-Cotta.

Baer, M. F., Connors, B. W., & Paradiso, M. A. (2009). *Neurowissenschaften. 3. Auflage*. Heidelberg: Spektrum.

Baethge, M., Achtenhagen,F., Arends, L., Babic, E., Baethge-Kinsky, V., & Weber, S. (2006). *PISA-VET - A Feasibility Study*. Stuttgart: Steiner.

Baumert, J., & Kunter, M. (2006). Stichwort: Professionelle Kompetenz von Lehrkräften. *Zeitschrift für Erziehungswissenschaft, 9*(4), 469–520.

Birbaumer, N., & Schmidt, R. F. (2010). *Biologische Psychologie*. 7., vollständig überarbeitete und ergänzte Auflage. Heidelberg: Springer.

Breuer, K. (2006). Kompetenzdiagnostik in der beruflichen Bildung - eine Zwischenbilanz. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 102*(2), 194–210.

Bruner, J. S., Goodnow, J. J., & Austin, G. A. (1956). *A study of thinking*. New York: Wiley.

Carver, C. S., Sutton, S. K., & Scheier, M. F. (2000). Action, emotion, and personality: Emerging conceptual integration. *Personality and Social Psychology Bulletin, 26*, 741–751.

Chomsky, N. (1965/1970). *Aspekte der Syntax-Theorie*. Frankfurt: Suhrkamp.

Ciompi, L. (2007). *Gefühle, Affekte, Affektlogik - Ihr Stellenwert in unserem Menschen- und Weltverständnis*. 2. Auflage. Wien: Picus.

Clore, G. (1994). Why emotions require cognitions. In P. Ekman, & R. Davidsson (Eds.) *The nature of emotion*. New York: Oxford University Press, 181–191.

Corsten, M. (2001). Berufsbildungsforschung in der Soziologie. In J. van Buer, A. Kell, & E. Wittmann (Eds.) *Berufsbildungsforschung in ausgewählten Wissenschaften und multidisziplinären Forschungsbereichen*. Frankfurt: Peter Lang, 53–106.

Damasio, A. (1995). *Descartes' Error: Emotion, Reason and the Human Brain*. New York: Avon.

Deci, E., & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E., & Ryan, R. (2002). *Handbook of self-determination research*. Rochester: The University Press.

Delamare-Le Deist, F., & Winterton, J. (2005). What is competence? *Human Resource Development International, 8*, 27–46.

Dörner, D. (1976). *Problemlösen als Informationsverarbeitung*. Stuttgart: Kohlhammer.

Dörner, D., & Kaminski, G. (1988). Handeln - Problemlösen - Entscheiden. In K. Immelmann, K. R. Scherer, C. Vogel, & P. Schmoock (Eds.) *Psychobiologie. Grundlagen des Verhaltens*. Stuttgart: Gustav Fischer, 375–415.

Ellsworth, P. (1994). Some reasons to expect universal antecedents of emotion. In P. Ekman, & R. Davidsson (Eds.) *The nature of emotion*. New York: Oxford University Press, 150–154.

Emmons, R. A. (1996). Striving and feeling: Personal goals and subjective well-being. In P. M. Gollwitzer, & J. A. Bargh (Eds.) *The psychology of action. Linking cognition and motivation to behaviour*. New York: The Guilford Press, 313–337.

Erpenbeck, J. & von Rosenstiel, L. (2003). Einführung. In J. Erpenbeck, & L. von Rosenstiel (Eds.) *Handbuch Kompetenzmessung - erkennen, verstehen und bewerten von Kompetenzen in der betrieblichen, pädagogischen und psychologischen Praxis*. Stuttgart: Schäffer-Poeschel, IX-XI.

Fay, D., & Frese, M. (2001). The concept of personal initiative: An overview of validity studies. *Human Performance, 14*(1), 97–124.

Frijda, N. (1988). The laws of emotion. *American Psychologist, 43*(5), 349–358.

Frijda, N. (1994). Emotions require cognitions, even if simple ones. In P. Ekman, & R. Davidsson (Eds.) *The nature of emotion*. New York: Oxford University Press, 197–292.

Gadenne, V. (1996). *Bewusstsein, Kognition und Gehirn. Einführung in die Psychologie des Bewusstseins*. Bern: Hans Huber.

Hacker, W. (1978). *Allgemeine Arbeits- und Ingenieurspsychologie*. 2. Auflage. Bern: Hans Huber.

Hartig, J., Klieme, E., & Leutner, D. (2008). *Measuring competencies: Introduction to concepts and questions of assessment in education*. Göttingen: Hogrefe.

Kleinginna, P., & Kleinginna, A. (1981). A categorized list of emotion definitions, with suggestions for a consensual definition. *Motivation and Emotion, 5*(4), 345–379.

Klieme, E., Avenarius, H., Blum, W., Döbrich, P., Gruber, H., Prenzel, M. et al. (Eds.) (2003). *Expertise zur Entwicklung nationaler Bildungsstandards*. Berlin: BMBF.

Klieme, E., & Leutner, D. (2006). Kompetenzmodelle zur Erfassung individueller Lernergebnisse und zur Bilanzierung von Bildungsprozessen. Beschreibung eines neu eingerichteten Schwerpunktprogramms der DFG. *Zeitschrift für Pädagogik, 52*(6), 876–903.

Kuhl, J. (2001). *Motivation und Persönlichkeit - Interaktionen psychischer Systeme.* Göttingen: Hogrefe.

Kunter, M., & Klusmann, U. (2009). Professionelle Kompetenz von Mathematiklehrkräften: Das COACTIV-Modell. In O. Zlatkin-Troitschanskaia, K. Beck, D. Sembill, R. Nickolaus, & R. Mulder (Eds.) *Lehrprofessionalität – Bedingungen, Genese, Wirkungen und ihre Messung*. Weinheim: Beltz, 153–165.

Kunter, M., Klusmann, U., Dubberke, T., Baumert, J., Blum, W., Brunner, M.; et al. (2007). Linking aspects of teacher competence to their instruction. Results from the COACTIV Project. In M. Prenzel (Ed.) *Studies on the educational quality of schools. The final report on the DFG Priority Programme*. Münster: Waxmann, 32–52.

Lazarus, R. S., Kanner, A. D., & Folkman, S. (1980). Emotions: A cognitive-phenomenological analysis. In R. Plutchik, & H. Kellerman (Eds.) *Emotion. Theory, research and experience*. Vol. 1: Theories of Emotion. New York: Academic Press, 189–217.

LeDoux, J. E. (1994). Emotion, memory and the brain. *Scientific American, 270*(6), 50–57.

Lehmann, R., & Seeber, S. (2007). *Ulme III. Untersuchung von Leistungen, Motivation*.

Leventhal, H., & Scherer, K. R. (1987). The relationship of emotion to cognition: A functional approach to a semantic controversy. *Cognition and Emotion, 1*(1), 3–28.

Lewis, C. I. (1946). *An analysis of knowledge and valuation*. LaSalle: Open Court Publishing Co.

Matthäus, W. (1988). *Sowjetische Denkpsychologie*. Göttingen: Universität.

Miller, G. A., Galanter, E., & Pribram, K. H. (1960). *Plans and the structure of behaviour*. New York: Holt Rinehart & Winston.

Neisser, U. (1974). *Kognitive Psychologie*. Stuttgart: Ernst Klett.

Nerdinger, F. W. (1995). *Motivation und Handeln in Organisationen. Eine Einführung*. Stuttgart: Kohlhammer.

Nerdinger, F. W., Blickle, G., & Schaper, N. (2008). *Arbeits- und Organisationspsychologie*. Heidelberg: Springer.

Newell, A., & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs: Prentice-Hall.

Otto, J., Euler, H., & Mandl, H. (2000). Begriffsbestimmungen. In J. Otto, H. Euler, & H. Mandl (Eds.) *Emotionspsychologie - Ein Handbuch*. Weinheim: Psychologie Verlagsunion, 11–18.

Panksepp, J. (1998). *Affective neuroscience: The foundations of human and animal emotions*. Oxford: Oxford University Press.

Rausch, A. (2011). *Erleben und Lernen am Arbeitsplatz in der betrieblichen Ausbildung*. Wiesbaden: VS Verlag.

Rausch, A., Scheja, S., Dreyer, K., Warwas, J., & Egloffstein, M. (2010). Emotionale Befindlichkeit in Lehr-Lern-Prozessen - Konstruktverständnis und empirische Zugänge. In J. Seifried, E. Wuttke, R. Nickolaus, & P. F. E. Sloane (Eds.) Lehr-Lern-Forschung in der kaufmännischen Berufsbildung - Ergebnisse und Gestaltungsaufgaben. *Beiheft 23 der Zeitschrift für Berufs- und Wirtschaftspädagogik*. Stuttgart: Franz Steiner, 193–215.

Ruiz-Primo, M. A. (2009). Towards a Framework for Assessing 21st Century Science Skills. White Paper. Washington DC: The National Academies. Retrieved from http://www7.nationalacademies.org/bose/Ruiz_Primo_21st_Century_Paper.pdf.

Rychen, D. S., & Salganik, L. H. (2003). A holistic model of competence. In D. S. Rychen, & L. H. Salganik (Eds.) *Key competencies for a successful life and well-functioning society.* Göttingen: Hogrefe & Huber, 41–62.

Scherer, K. R. (1981). Wider die Vernachlässigung der Emotionen in der Psychologie. *Bericht über den 32. Kongress der Deutschen Gesellschaft für Psychologie, 1*, 304–317.

Scherer, K. R. (1994). An Emotion's Occurrence Depends on the Relevance of an Event to the Organism's Goal/Need Hierarchy. In P. Ekman, & R. Davidson (Eds.) *The Nature of Emotion*. New York: Oxford University Press, 227–231.

Scherer, K. R. (1999). Appraisal theory. In T. Dalgleish, & M. Power (Eds.) *Handbook of Cognition and Emotion*. Hoboken: John Wiley & Sons, 637–663.

Schumacher, L. (2002). *Emotionale Befindlichkeit und Motive in Lerngruppen*. Hamburg: Dr. Kovac.
Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective. In E. T. Higgens, & R. M. Sorrentino (Eds.) *Handbook of motivation and cognition. Foundations of Social Behaviour*. Volume 2. New York: The Guilford Press, 527–561.
Sembill, D. (1992). *Problemlösefähigkeit, Handlungskompetenz und Emotionale Befindlichkeit*. Göttingen: Hogrefe.
Sembill, D. (1995). Research Learning: How to get Top Students. In R. Olechowski, & G. Svik (Eds.) *Experimental Research on Teaching and Learning*. Bern: Lang, 129–146.
Sembill, D. (2003). Emotionale Befindlichkeit als bestimmende und sinngebende Voraussetzung von Lern- und Lebenswirklichkeit. In J. van Buer, & O. Zlatkin-Troitschanskaja (Eds.) *Berufliche Bildung auf dem Prüfstand - Entwicklung zwischen systemischer Steuerung, Transformation durch Modellversuche und unterrichtlicher Innovation*. Band 5. Frankfurt: Peter Lang, 181–205.
Sembill, D. (2010). Emotionen in ihrer Funktionalität für das Lernen. In R. Nickolaus, G. Pätzold, H. Reinisch, & T. Tramm (Eds.) *Handbuch Berufs- und Wirtschaftspädagogik*. Bad Heilbrunn/Obb.: Klinkhart, 80–84.
Sloane, P. F. E. (2008). Vermessene Bildung - Überlegungen zur Entwicklung des Deutschen Qualifikationsrahmens. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 104*(4), 481–502.
Smith, C. A., & Kirby, L. D. (2000). Consequences require antecedents: Toward a process model of emotion elicitation. In J. P. Forgas (Ed.) *Feeling and thinking. The role of affect in social cognition*. Cambridge.: Cambridge University Press, 83–108.
Smith, C. A., Organ, D. W., & Near, J. P. (1983). Organizational citizenship behaviour: its nature and antecedents. *Journal of Applied Psychology, 68*(4), 653–663.
Spencer, L. M., McClelland, D., & Spencer, S. M. (1994). *Competency assessment methods. History and state of the art*. Boston: Hay/McBer Research Press.
Storbeck, J., & Clore, G. L. (2008). Affective arousal as information: How affective arousal influences judgements, learning, and memory. *Social and Personality Psychology Compass, 2*(5), 1824–1843.
van Reekum, C. M., & Scherer, K. R. (1997). Levels of Processing in Emotion - Antecedents Appraisal. In G. Matthews (Ed.) *Cognitive Science Perspectives on Personality and Emotion*. Amsterdam: Elsevier, 259–300.
von Cranach, M., & Bangerter, A. (2000). Wissen und Handeln in systemischer Perspektive. Ein komplexes Problem. In H. Mandl, & J. Gerstenmaier (Eds.) *Die Kluft zwischen Wissen und Handeln. Empirische und theoretische Lösungsansätze*. Göttingen: Hogrefe, 221–252.
Weinert, F. E. (2001). Vergleichende Leistungsmessung in Schulen - eine umstrittene Selbstverständlichkeit. In F. E. Weinert (Ed.) *Leistungsmessungen in Schulen*. Weinheim: Beltz, 17–31.
Winther, E. (2010). *Kompetenzmessung in der beruflichen Bildung*. Bielefeld: Bertelsmann.
Wuttke, E. (1999). *Motivation und Lernstrategien in einer selbstorganisationsoffenen Lernumgebung. Eine empirische Untersuchung bei angehenden Industriekaufleuten*. Frankfurt: Peter Lang.

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ADAPTION OF THE TSRQ FOR FINANCIAL BEHAVIOR

The Trait Self Regulation Questionnaire (TSRQ) is an instrument to measure general self-regulative capabilities. In 1999, Klaus Breuer translated this instrument into a German version and adapted it to the field of self-regulation in educational processes within vocational training. The validity of the German TSRQ has been verified in a number of studies (Breuer & Brahm, 2004; Breuer & Eugster, 2006). Furthermore, Klaus Breuer considered the question of variability in self-regulation. In a longitudinal study he was able to show that self-regulation is influenced by the situational context and it is therefore a dynamic construct (Breuer, 2004, pp. 10–14).

This chapter focuses on a further domain-specific adaption of the TSRQ. In 2006, Klaus Breuer initiated the research project "Development of mental models towards credit relationships in social networks". Within this project a further version of the TSRQ concerning self-regulation towards individual money management was designed. As a modification of the TSRQ version by O'Neil and Herl (1998), the questionnaire of self-regulated money management is based on similar theoretical ideas, which will be discussed in this paper. The purpose of this modification was to create an instrument which could be applied to measure the traits of individual money management.

The efforts to implement extensive financial education in Germany are increasing. Therefore, it is obvious that the individual's capabilities to handle money in a sustainable, self-reliant and socially accountable way need to be improved. Based on the meta-cognitive and motivational dimensions of self-regulation within the CRESST[1] Model of problem solving (Herl et al., 1999, p. 1) the items of the origin TSRQ were modified to situations with financial reference. Due to the fact that contentual modifications were implemented, it is necessary to examine the dimensional structure of the questionnaire of self-regulated money management through factor analysis.

INTRODUCTION

With his social learning theory, Bandura (1979) pointed to the significance of self-regulative capabilities especially in the learning context. Hence, the construct of self-regulation has gained increasing attention in questions of individual learning requirements. There are various modeling concepts about the issue of self-regulation. Within the *component model* the focus is on the meta-cognitive and motivational traits for self-regulated learning. Breuer and Brahm (2004) make use of the self regulation part of the CRESST Model for problem solving, which is shown in Figure 1.

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 213–224.

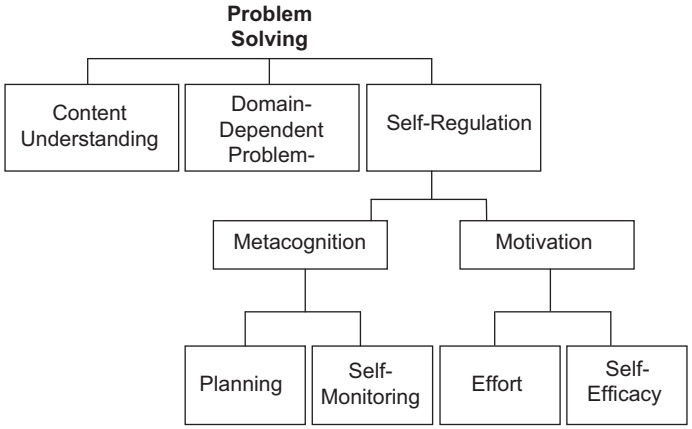

Figure 1. CRESST Model for Problem Solving (Herl et al., 1999, p. 1).

Breuer and Brahm (2004) focus on the meta-cognitive and motivational elements of this model, which are described as *planning*, *self-monitoring*, *effort* and *self-efficacy*. They confirmed the validity of the four-dimensional structure of self-regulation for the German version of the TSRQ.[2] In the CRESST Model, self-regulation is described by its components. There are also models of self-regulation which focus on the process of self-regulation, as Figure 2 shows.

Within the pre-actional phase, common tasks were analyzed for their difficulty and their goal attainability while regarding the actual situation. Therefore, personal resources like situational motivation, self-efficacy, energy and emotions were estimated. Learning strategies to reach certain objectives were used within the actional phase. These strategies were implemented while observing their own tasks. Finally, in the post-actional phase, the achievement was evaluated and reflected upon in terms of efficacy, personal contribution, quantity and quality. During this phase, modifications of the learning strategies used or adaptations in the level of the targeted objectives were possible (Schmitz & Schmidt, 2007).

Those models of self-regulation which refer to the components highlight the concept of self-efficacy as the main influence for self-regulation (Bandura, 1997, p. 3; Friedrich & Mandl, 1997, p. 244; Jerusalem, 2005, p. 7). Within this concept, two central cognitive ideas were distinguished; efficacy expectations, which refer to the assessment of individual capabilities, and outcome expectations, which refer to the consequences of individual behavior (see Figure 3). The theory of self-efficacy means a person can build a subjective prognosis about the results of actions on the basis of the assessment of their own capabilities (Krapp & Ryan, 2002, p. 56).

In a large number of studies, the significance of self-efficacy as the main influence for motivation, capacity and effort has been demonstrated (Jerusalem & Schwarzer, 2002, p. 10; Breuer et al., 2009, p. 265). According to Schwarzer and Jerusalem (2002,

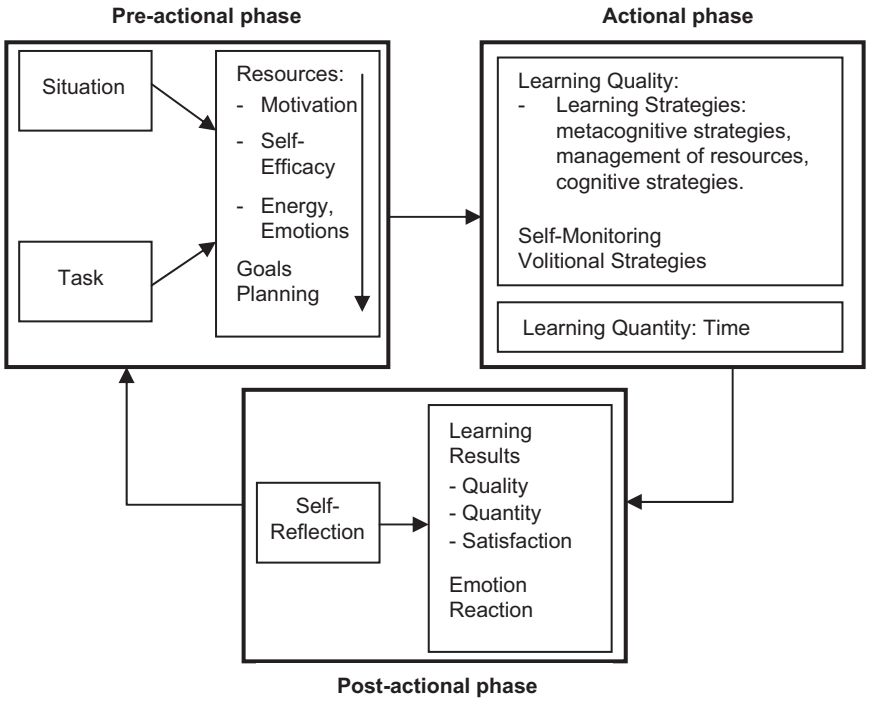

Figure 2. Process of self-regulation (referring to Schmitz & Schmidt, 2007, p. 12).

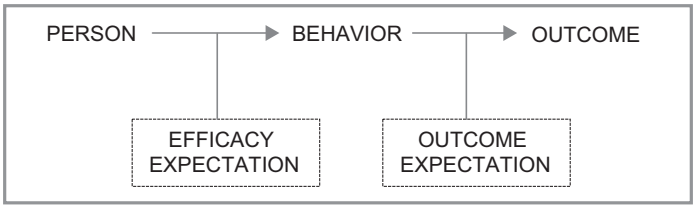

Figure 3. Efficacy expectations and outcome expectations (Krapp & Ryan, 2002, p. 56).

pp. 37–38), self-efficacy can be seen as the key to competent self-regulation. Self-efficacy therefore affects the individual's willingness to choose challenging tasks and to persevere with these tasks (Breuer et al., 2009, p. 94). Furthermore, characteristics such as the individual's ability to plan and manage their behavior can influence the success of a learning process. To describe learning behavior, self-regulation seems to be a suitable concept with a valid theoretical background. Unfortunately, self-regulated behavior is not only a question within the learning context; it also affects every field of activity that interacts with the development of individual autonomy.

The beginning of a vocational training program is a situation where such individual autonomy is developed. Particularly at this time, young trainees earn their first income so they have to be able to make personal financial decisions sustainably and socially accountably. During vocational apprenticeship, their consumption and investment requirements are confronted with a low level of monetary resources. To fill this gap, young people tend to take out a loan (mostly personal credit). Even though the majority of young people are capable of handling their financial challenges in the transition to adulthood, rising numbers cannot. This finding is supported by a large number of studies which are dealing with the phenomenon of youth indebtedness and over-indebtedness (cf. Korczak, 2006; Gabanyi, Hemedinger & Lehner, 2007; Bürgel, 2010). Due to the fact that these studies refer to the statistics of credit bureaus or credit reporting agencies, which do not report personal credit, a number of unreported cases is to be expected.

Especially during the vocational education and training phase, young people have to balance their financial needs and their financial obligations. At this time, juveniles and young adults are thought to establish the balance in their financial behavior to make their contribution towards the national economy and the so-called intergenerational contract. However, it is difficult for young people to cope with the financial challenges in modern times and the development of financial autonomy. This difficulty is due to complex financial products, deficient advice in financial questions, missing approaches to financial education, as well as the increasing challenges in individual money management (for example, the requirement of mental arithmetic for calculation). Therefore, we need instruments to measure self-regulated money management and we have to define dimensions which describe the influences on individual money management.

One opportunity is given by the adaption of the TSRQ. The TSRQ focuses on self-regulated processes in the learning context of young apprentices. It includes the dimensions of self-regulation as described in Figure 1 and resumed in the following figure.

Within the planning phase, all actions necessary to reach a targeted state were anticipated and structured. Self-monitoring helps to control the achievement of

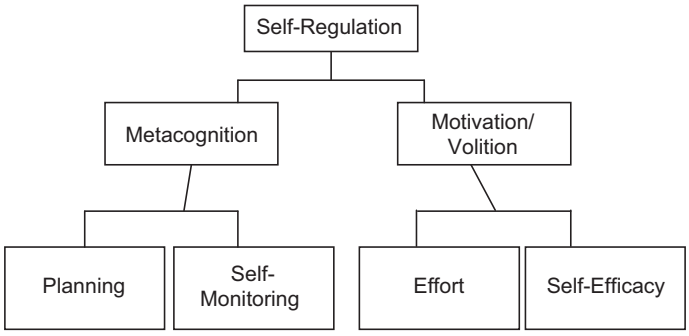

Figure 4. Self-Regulation Model (Breuer & Brahm, 2004).

sub-goals and gives information about improvement in the decision-making process and therefore about the necessity to modify the activities. The engagement or willingness to keep up the required effort for self-regulated behavior is assigned to the motivational dimension of self-regulation. Finally, self-regulated behavior is influenced by personal self-efficacy. The items for planning, self-monitoring, effort, and self-efficacy were originally formulated by Hong and O'Neil (2001) and Herl et al. (1999). The planning scale measures the capability to gauge the demands of a task prior to its execution. The self-monitoring subscale evaluated the respondent's awareness of their actions during execution of the task. The effort subscale measured the respondent's willingness to attain the goal of the task (Jonker et al., 2010, p. 48). Self-efficacy refers to the confidence in one's own capabilities (Schwarzer, 1995; O'Neil & Herl, 1998). The following table presents some examples for every scale.

Table 1. Subscales and items from the adapted TSRQ (Bender, 2012)

Dimension	*Subscale*	*Item (Examples)*
Metacognition	Planning	*I plan my financial transactions very carefully.*
	Self-Monitoring	*While spending money I always check how much I can afford.*
Motivation/ Volition	Effort	*Before signing a contract, I read the information very carefully.*
	Self-Efficacy	*I am sure I can handle every financial decision in life.*

On the basis of existing findings, self-efficacy is considered to be the main influence on self-regulated behavior. According to Schwarzer and Jerusalem (2002, p. 37), a person with a high level of self-efficacy sets higher objectives within the motivational phase. A high level of self-efficacy leads to a systematic monitoring of actions. Furthermore, self-efficacious persons are able to summon and to maintain the effort to reach a goal. Krapp and Ryan (2002, p. 54) confirm the high prognostic significance of self-efficacy in different situations. Self-efficacy, or rather optimistic intrinsic values, can be seen as a key for competence and self-regulation (Schwarzer & Jerusalem, 2002, p. 37).

Self-efficacy has to be distinguished from self-concept. While self-efficacy refers to confidence in one's own abilities in a specific situation, self-concept includes all aspects concerning the individual's ability and their emotional state (Boekaerts, 1998, p. 100). There is no need to define a specific context with regard to one's self-concept. According to Breuer et al. (2009, p. 153), self-efficacy is closely linked to the concept of competence in terms of the self-determination theory[3] (Deci & Ryan, 1993; 2000). Here, competence is assumed to be conducive to developing intrinsic motivation (Krapp & Ryan, 2002, p. 59). Therefore, the advancement of competence has a positive effect on an individual's self-efficacy.

Adaption of the Factorial Structure

To measure self-regulation in private money management, items from the TSRQ[4] were adapted to the financial context. Previous pilot studies[5] concerning self-regulation in the field of private money management indicate a measurement model with three factors. The two dimensions, planning and self-monitoring, were combined to form the single dimension "accuracy in making financial decisions". A strong correlation between planning and self-monitoring is reasonable, assuming that their action control is only useful if an objective is set and the minimum requirements to reach the objective are determined. The interdependence between planning and self-monitoring is validated through literature (Wild, 1974, p. 44; Seel, 2003, p. 232; Schreblowski & Hasselhorn, 2006, p. 153). The dimensions *self-efficacy toward a successful money management* and *effort to deal with financial challenges* are similar between the original scale and the adapted scale for the field of private money management. Deviating from the four-factor structure in the genuine TSRQ, we can find a measurement model for self-regulation in the field of private money management as shown in the following figure:

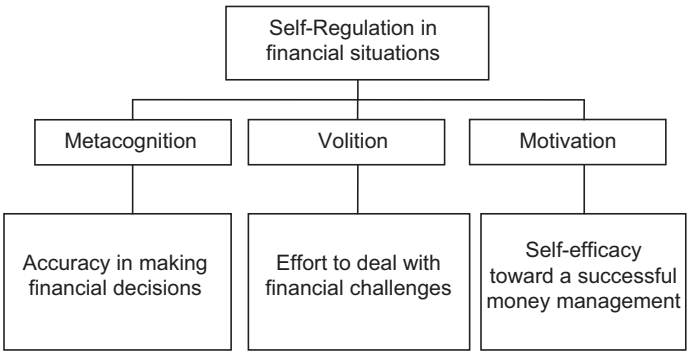

Figure 5. Three-factor measurement model for self-regulation in financial situations.

The structure with three dimensions and three factors is the result of an exploratory factor analysis concerning the pilot study. To control the validity of this three-factor model, a confirmatory factor analysis was computed by using the data of the main study (651 participants). The quantitative outcomes of the factor analysis, as well as the main study, will be described in the following section.

Verification of the Factor Model

In the context of the main study, an e-questionnaire containing the self-regulation scale was administered to 651 participants. It was a quasi-experimental approach

covering apprentices in the German dual system of vocational training.[6] The three training programs are dedicated to the bank clerk, the industrial clerk and the mechatronics fitter/information technology specialist. The decision to study these three groups was made for the following reasons: First, the entrance requirements from companies when selecting new apprentices are roughly equivalent for the three occupations. Second, the trainees in the three selected programs earn similar wages. Hence these apprentices experienced similar scopes of action in handling their personal finances. Third, the three training programs provide different intensities of occupational experiences in reference to money. The 'mechatronic fitters' and 'information technology specialists' have a small focus on money in their curriculum with respect to book-keeping and costs. This focus is extended for the industrial clerk with respect to trading goods. The bank clerks then have a high intensity in their program because they are trained in advising private customers on how to allocate financial resources. Additionally, trainees were tested at the beginning and before the end of their apprenticeship programs.

Given *a priori* theoretical arguments for the four-factor model and statistical arguments for the three-factor model (based on the exploratory factor analysis), it would be informative to test both models and to test the "goodness of fit" for each of these models. Based on a confirmatory factor analysis, we therefore compared the ability of the two different models (the three-factor model and the four-factor model) to account for the set of data from the main study. The results of the confirmatory factor analysis for both models are shown in Table 2.

Tab. 2. Results of the confirmatory factor analysis[7]

	Chi-Square Test of Model Fit	*Root Mean Square Error of Approximation (RMSEA)*	*Comparative Fit Index (CFI)*	*Standardized Root Mean Square Residual (SRMR)*
Model fit of the 3-factor model	Value: 370.336 df: 101 P-Value: 0.000	0.064	0.915	0.048
Model fit of the 4-factor model	Value: 437.603 df: 113 P-Value: 0.000	0.066	0.899	0.051

When a factor model fits the data, the factor loadings are chosen to minimize the discrepancy between the correlation matrix implied by the model and the actual observed matrix. The most commonly used test for model adequacy is the Chi^2 goodness-of-fit test. It indicates the amount of variation between expected and

observed covariance matrices. The null hypothesis for this test implies that the model adequately accounts for the data. Unfortunately, this test is highly sensitive to the size of the sample. With an increasing sample size, the Chi^2 goodness-of-fit test is more sensitive to variations in the model and therefore small deviations can lead to a rejection of the null hypothesis, even when the factor model is mainly appropriate (cf. Weiber & Mühlhaus, 2010, p. 161; Bühner, 2011, pp. 424–425). The Root Mean Square Error of Approximation (RMSEA) is related to the residual in the model. RMSEA values range from 0 to 1, while a smaller RMSEA value indicates a better model fit. An acceptable model fit is indicated by RMSEA values of 0.08 or less (Weiber & Mühlhaus, 2010, p. 162). The RMSEA for both models indicates an acceptable value but the three-factor model has a slightly better fit. The Comparative Fit Index (CFI) is equal to the discrepancy function which is adjusted for sample size. CFI values range from 0 to 1, with larger values indicating a better model fit. An acceptable model fit is indicated by CFI values of 0.90 or greater (Weiber & Mühlhaus, 2010, p. 170). The CFI value of 0.915 for the three-factor model indicates an acceptable model fit, while the value for the four-factor model is marginal (0.899). The Standardized Root Mean Square Residual (SRMR) evaluates the parts of the covariances that are not explained by the model (residuals). It is calculated as the root of mean discrepancies between the elements of the two covariance matrices. SRMR values range from 0 to 1, while a smaller value indicates a better model fit. An acceptable model fit is indicated by SRMR values of 0.10 or less (Weiber & Mühlhaus, 2010, p. 166). The SRMR values for both models indicate acceptable fits but again the 3-factor model has a slightly better one.

Overall, both models fit the data acceptably. Despite everything, the three-factor model seems to fit better at previously mentioned points (see above). Additionally, more restrictive models with fewer dimensions are generally preferred. Figure 6 shows the standardized result of the CFA for the three-factor model. Based on the theoretical information and the results of the exploratory factor analysis, the model consists of a single, higher-order factor (self-regulation in financial situations). It can be explained with the help of three underlying latent factors (accuracy in financial decisions, self-efficacy toward a successful money management, and effort to deal with financial challenges). Each of these latent factors is measured with the help of manifest items. The model proposes that the variables (SR1 through $SR17^8$) are influenced partially by the underlying common factors (factor 1 through factor 3) and partially by underlying unique factors (e1 through e17 and ef1 through ef3).

The values on the arrows between the underlying unique factors and the items are the R^2 values for each item (see Figure 6). These values were calculated as one minus the squared standardized uniqueness, and indicate the proportion of variance in each item with respect to the factor on which it loads. These values indicate the degree to which the variance of each item is caused by the latent variable. As a minimum estimate for the item reliability, a few of these values vary highly from an acceptable reliability measure. A reason for this is that the reliability of a single item can never be as high as the reliability of a scale (cf. Bühner, 2011, p. 446; Hoyle, 2000, p. 489).

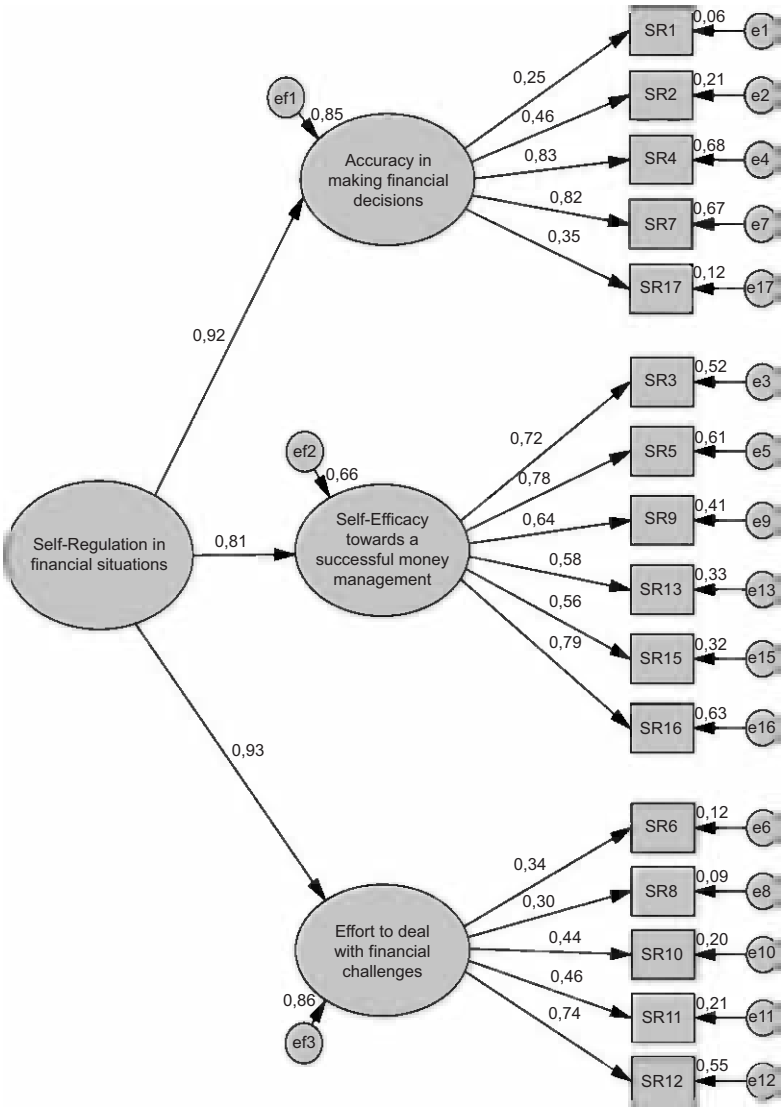

Figure 6. Path diagram of the three-factor model of self-regulation in financial situations.

DISCUSSION

Deviating from the original four-factor model, in the context of vocational education and training processes, we can ascertain a three-factor model for self-regulation in private money management. Concerning metacognition, there is one explanatory

dimension labeled "accuracy in making financial decisions" which includes aspects of planning and monitoring concurrently. Within the scope of motivation and volition, we can factor "self-efficacy toward successful money management" and "effort to deal with financial challenges" into the measurement model. With these dimensions, the adaption of the original measurement model of the TSRQ (which focuses on vocational learning processes) to the context of financial behavior is executed. A broad validation oriented on the rules of random sampling is still to be studied.

The first survey using the adapted questionnaire was realized with the objective of identifying internal and external influences on self-regulation in private money management. In her study, Bender (2012) showed that financial self-regulation is not only a multidimensional construct but is also influenced by several factors. Preliminary approaches towards people's financial abilities, in the sense of self-regulated behavior, are knowledge-based and therefore one-dimensional. According to the results of Bender (2012), financial knowledge is an important factor to explain one's self-regulation in private money management but there is another factor which is vastly superior: the individual's self-concept of their financial abilities. If financial literacy is supposed to achieve the development of self-regulated capabilities in money management, it is not enough to offer curricular approaches which only refer to declarative financial knowledge. It is necessary to contrive ways and means to encourage the individual's self-concept. For this purpose, ideas can be gathered from Bandura's social learning theory (1979).

NOTES

[1] CRESST is an abbreviation for Center for Research on Evaluation, Standard, and Student Testing.

[2] The empirical findings refer to 360 participants following a vocational education and training program within the German dual system. The German dual apprenticeship system combines formal training programs within a company and vocational or business education at a vocational school in one aligned curriculum.

[3] The self-determination theory (SDT) makes a distinction between the strength of motivation and the focus of motivation (Deci & Ryan, 1993). The focus of motivation determines why a person is motivated. The self-determination theory mentions five types of motivation; external, interjected, identified, integrated and intrinsic (Deci & Ryan, 2000; Krapp & Ryan, 2002).

[4] ©1999 Klaus Breuer for the version in German language.

[5] Pilot study within the research project "Mental models toward credit relationships in networks". The survey questioned 61 juveniles and young adults; 27 indebted and 34 not indebted (Bender & Breuer, 2011, pp. 45–62).

[6] The German dual apprenticeship system combines formal training programs within a company and vocational or business education at a vocational school in one aligned curriculum.

[7] To evaluate the model fit, the standard fit indices are used. Bühner (2011, pp. 418–427) suggests using these indices as they cover an absolute model fit as well as an approximated model fit.

[8] Item SR14 was excluded from the scale because of the results of the explorative factor analysis.

REFERENCES

Bandura, A. (1979). *Sozial-kognitive Lerntheorie/Social learning theory/*. Stuttgart: Klett-Cotta.
Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bender, N. (2012). *Selbstreguliertes Geldmanagement bei jungen Erwachsenen/Self-regulated money management of adolescents/.* Mainz: Doctoral Thesis: JGU Mainz (In print: Frankfurt: Peter Lang).

Bender, N., & Breuer, K. (2011). Junge Menschen und frühe Schulden – finanzielle Handlungskompetenz im Fokus wirtschaftspädagogischer Forschung/Young people and early debt – financial ability to perform in the focus of economic educational research/. In Exzellenzcluster „Gesellschaftliche Abhängigkeiten und soziale Netzwerke" (Ed.) *Krisen und Schulden – Historische Analysen und gegenwärtige Herausforderungen/Crises and debts – historical analysis and present challenges/.* Wiesbaden: VS Verlag, 45–62.

Boekaerts, M. (1998). Do culturally rooted self-construals affect students' conceptualization of control over learning? *Educational Psychologist, 33*(2/3), 87–108.

Breuer, K. (1999). *Befähigung zur Selbstregulation in der beruflichen Aus- und Weiterbildung (Fragebogen zu Lernen und Denken). Deutsche Fassung des Trait Self-Regulation Questionnaire (TSRQ) nach* O´Neil & *Herl/The ability for self-regulation in vocational education and training (Questionnaire for learning and thinking). German version of the TSRQ according to O'Neil & Her*l/. Unveröffentlichter Fragebogen. Mainz.

Breuer, K. (2004). The development of traits of self-regulation in vocational educa-tion and training – A Longitudinal Study, Fachbereich Rechts- und Wirtschaftswissenschaften der Johannes Gutenberg-Universität Mainz, Reihe: Arbeitspapiere WP, Paper presented at the AERA-Conference 2004 in San Diego, California, USA. http://www.wipaed.uni-mainz.de/beck/publicat/Frame_Publikationen.htm.

Breuer, K., & Brahm, T. (2004). Die Abbildung von Befähigung zur Selbstregulation/The representation of the ability for self-regulation/. In M. Wosnitza, A. Frey, & R. S. Jäger (Eds.) *Lernprozess, Lernumgebung und Lerndiagnostik. Wissenschaftliche Beiträge zum Lernen im 21. Jahrhundert / Learning process, learning environment and learning diagnostics. Scientific contributions to learning in the 21st century*/. Landau: Empirische Pädagogik, 363–374.

Breuer, K., & Eugster, B. (2006). Effects of training and assessment in vocational education and training (VET): Reflections on the methodology of assessing the development of traits of self-regulation. *Studies in Educational Evaluation, 3*(32), 243–261.

Breuer, K., Tauschek, R., Becker, H., Ettmüller, W., & Etzkorn, K. (Eds.) (2009). *Der Modellversuch KoLA. Vom Lernfeld zum schulspezifischen Jahresarbeitsplan – von der Lernsituation zum selbstgesteuerten Lernen und zu ersten Ergebnissen einer Längsschnittstudie/Model Test KoLA. From learning fields to school-specific work schedules – from learning situations to self-regulated learning. First results of a longitudinal analysis.* Frankfurt: Peter Lang.

Bühner, M. (2011). *Einführung in die Test- und Fragebogenkonstruktion/Introduction into test and questionnaire construction/.* München: PearsonStudium.

Bürgel Wirtschaftsinformationen GmbH & Co. KG. (2010). *Schuldenbarometer im 1. Halbjahr 2010/ Debt Barometer in the first half year of 2010.* http://www.buergel.de/presse/ studien-analysen/464-schuldenbarometer-1-halbjahr-2010.html.

Deci, E. L., & Ryan, R. M. (1993). Die Selbstbestimmungstheorie der Motivation und ihre Bedeutung für die Pädagogik/The self-determination theory of motivation and the relevance for pedagogy/. *Zeitschrift für Pädagogik* /Journal for pedagogics/, 39(2), 223–238.

Deci, E. L., & Ryan, R. M. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, *25*, 54–67.

Friedrich, H. F., & Mandl, H. (1997). Analyse und Förderung selbstgesteuerten Lernens/Evaluation and promotion of self-regulated learning/. In F. Weinert, & H. Mandl (Eds.) *Psychologie der Erwachsenenbildung. Enzyklopädie der Psychologie, Pädagogische Psychologie/Psychology of adult education. Encyclopedia of psychology, Pedagogical psychology/.* Göttingen: Hogrefe, 237–293.

Gabanyi, A., Hemedinger, F., & Lehner, M. (2007). *Jugendverschuldung: Analyse und Präventionsansätze/ Youth indebtedness: Analysis and prevention*. Linz: edition pro mente.

Herl, H. E., O'Neil, H. F., Chung, G., Bianchi, C., Wang, S., Mayer, R., Lee, C.Y., Choi, A., Suen, T., & Tu, A. (1999). *Final Report for Validation of Problem-Solving Measures. CSE Technical Report 501, 1999*. The Regents of the University of California. http://www.cse.ucla.edu/products/Reports/ TECH501.pdf.

Hong, E., & O'Neil, H. F., Jr. (2001). Construct validation of a trait self-regulation model, *International Journal of Psychology, 36,* 186–194.

Hoyle, R. H. (2000). Confirmatory Factor Analysis. In H.E.A. Tinsley, & S.D. Brown (Eds.), *Handbook of Applied Multivariate Statistics and Mathematical Modeling*. Academic Press, 465–497. Retrieved at 26.03.2012 from http://ac.els-cdn.com/B9780126913606500173/3-s2.0-B9780126913606500173-main.pdf?_tid=af593841ddb7249b41e99ac631ace6b5&acdnat=1332780078_3073c8d6dd2dd79d3ded727787d6c908.

Jerusalem, M. (2005). *Selbstwirksamkeit/Self-Efficacy/*. In H. Weber, & T. Rammsayer (Eds.) *Handbuch der Persönlichkeitspsychologie und Differentiellen Psychologie*/*Handbook of personality psychology and differential psychology*/. Göttingen: Hogrefe, 438–446.

Jerusalem, M., & Schwarzer, R. (2002). SWE. Skala zur Allgemeinen Selbstwirksamkeitserwartung / SWE. Scale for general perceived self-efficacy/. In E. Brähler, J. Schumacher, & B. Strauß (Eds.) *Diagnostische Verfahren in der Psychotherapie (Diagnostik für Klinik und Praxis)*/*Diagnostical Procedure in psychological therapy (Diagnostics for medical center and praxis)/*. Göttingen: Hogrefe, 362–366.

Jonker, L., Elferink-Gemser, M. T., Toering, T. T., Lyons, J., & Visscher, C. (2010). Academic performance and self-regulatory skills in elite youth soccer players. *Journal of Sport Sciences, 28, 43–57*. Publisher: http://www.informaworld.com http://dissertations.ub.rug.nl/FILES/faculties/medicine/2011/t..t.toering/03c3.pdf.

Korczak, D. (2006). Überschuldung im Kontext der Modernisierung/Over-indebtedness in the context of modernization. In D. Korczak (Ed.) *Geld und andere Leidenschaften/Money and other passions.* Kröning: Asanger, 153–179.

Krapp, A., & Ryan, R. (2002). Selbstwirksamkeit und Lernmotivation. Eine kritische Betrachtung der Theorie von Bandura aus Sicht der Selbstbestimmungstheorie und der pädagogisch-psychologischen Interessentheorie/Self-Efficacy and learning motivation. A critical reflection of Bandura's theory from the viewpoint of the self-determination theory and the pedagogical-psycological theorie of interests/. In M. Jerusalem, & D. Hopf (Eds.) *Lernwirksame Schulen/Learning-efficiant schools*/. Weinheim: Beltz, 54–82.

O'Neil, Harold F. Jr., & Herl, Howard E. (1998). *Reliability and Validity of a Trait Measure of Self-Regulation*. Papers presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Schmitz, B., & Schmidt, M. (2007). Einführung in die Selbstregulation/Introduction to Self-regulation/. In M. Landmann, & B. Schmitz (Eds.) *Selbstregulation erfolgreich fördern. Praxisnahe Trainingsprogramme für effektives Lernen/Successful Promotion of Self-Regulation*/. Stuttgart: Kohlhammer, 9–18.

Schreblowski, S., & Hasselhorn, M. (2006). Selbstkontrollstrategien: Planen, Überwachen, Bewerten /Self-control strategies: planning, controlling, evaluation/. In H. Mandl, & F. Friedrich (Eds.) *Lernstrategien* /*Learning strategies*/. Göttingen: Hogrefe, 151–161.

Schwarzer, R. (1995). Entwicklungskrisen durch Selbstwirksamkeitserwartung meistern/Coping with developmental crisis through self-efficacy/. In W. Edelstein (Ed.) *Entwicklungskrisen kompetent meistern. Der Beitrag der Selbstwirksamkeitstheorie von Albert Bandura zum pädagogischen Handeln/ Coping with developmental crisis competently. The contribution of Albert Banduras' self-efficacy theory to pedagogy*. Heidelberg: Roland Asanger, 25–34.

Schwarzer, R., & Jerusalem, M. (2002). Das Konzept der Selbstwirksamkeit/Self-efficacy. In M. Jerusalem, & D. Hopf (Eds.) Selbstwirksamkeit und Motivationsprozesse in Bildungsinstitutionen/Self-efficacy and motivational processes/, *Zeitschrift für Pädagogik, 44. Beiheft,* 28–53. Weinheim: Beltz.

Seel, N. M. (2003). *Psychologie des Lernens*/*Learning psychology*/. München: Ernst Reinhardt (UTB).

Weiber, R., & Mühlhaus, D. (2010). *Strukturgleichungsmodellierung*/*Structural equation modelling*/. Heidelberg: Springer.

Wild, J. (1974). *Grundlagen der Unternehmensplanung*/*Essentials of business planning*/. Reinbek bei Hamburg.

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DIAGNOSTIC COMPETENCE OF (PROSPECTIVE) TEACHERS IN VOCATIONAL EDUCATION

An Analysis of Error Identification in Accounting Lessons

INTRODUCTION

Diagnostic competence is considered an important facet of teacher competence that can have a positive impact on learning processes and the performance of students (KMK, 2004; Bruder et al., 2010). Precise diagnosis generally goes hand in hand with better teachers: they are able to adapt their teaching to the individual needs of their students (Helmke, Hosenfeld & Schrader, 2004; Vogt & Rogalla, 2009). Various studies (e.g. PISA) show that teachers are often lacking in this field. This might – at least partly – be due to the fact that in most teacher education programs pedagogical diagnostics are gravely neglected (Helmke, Hosenfeld & Schrader, 2004).

Questions regarding diagnostic competence can be dealt with in regard to the current discussion on teacher competences. Three categories of professional knowledge, generally considered to be distinctly different, are seen as crucial: (1) general pedagogical knowledge, (2) pedagogical content knowledge, and (3) content knowledge (Graeber & Tirosh, 2008; Hill, Ball & Schilling, 2008; Shulman, 1986). The broadest and most common definition of professional teacher competence is a complex construct which includes knowledge, beliefs and motivational orientations (Baumert & Kunter, 2006; Desimone, 2009). Referring to Shulman, pedagogical content knowledge (PCK) can be described as a specific type of knowledge on how to transform knowledge of subject content into teaching. This kind of knowledge supports abilities such as the effective structuring of lessons, the use of specific representations or analogies, and an awareness of possible mistakes, misconceptions or content-related learning difficulties (van Driel & Berry, 2010). We will narrow our focus on diagnostic competence to professional error competence, which is a teacher's ability to diagnose student errors and use them constructively in the classroom (Wuttke & Seifried, 2009). Our focus is on business education and in particular on accountancy. In this field little is known about student errors and which competences teachers need to diagnose and handle them constructively.

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DIAGNOSTIC COMPETENCE

A general view on diagnostic competence

The diagnostic competence of teachers has become one of the more frequently mentioned topics in education policy and administration. Nevertheless, there is still a lack of systematic research in this area (Schrader, 2009). Diagnostic competence is generally seen as a teacher's ability to judge the learning and behavior of his/her students according to criteria that are determined beforehand. Furthermore, diagnostic competence includes the ability to foster learning processes of individual students (Artelt & Gräsel, 2009; Schwarz, Wissmach & Kaiser, 2008). To gain this ability, teachers need to understand not only the curriculum contents and student competencies, but are also required to match tasks to the knowledge and skills of their students (Hollenweger, 2011).

Diagnostic competence has also been recognized as an important component of teacher training. Not only is it part of the recommendations for teacher training in Germany (KMK, 2004), but it is also one of the five core propositions of the US National Board for Professional Teaching Standards (Hollenweger, 2011). However, despite its broad recognition and inclusion in teacher training curricula, the concept of diagnostic competence remains elusive and research results are inconsistent. Generally, diagnostic competence is understood as a multidimensional construct. It consists of facets of pedagogical content knowledge (about the domain specific cognitive processes of students and knowledge about "typical" tasks, difficulties, and errors) and pedagogical-psychological knowledge (knowledge about assessment and evaluation processes and tools). Diagnostic processes influence students' learning. Unfortunately studies show that teachers often lack the capability to judge the performance, ability, commitment and heterogeneity of their students adequately and precisely (Baumert et al., 2001; Brunner et al., 2011).

There are various areas of research that deal with the diagnostic competence of teachers. Research is situated in several domains and categories of schools. Frequently, cognitive facets are addressed (i.e. to assess students' *knowledge*), but there are only very few studies on teachers' ability to diagnose the emotional and motivational states of learners, e.g. the level of interest (for vocational education, see Krapp & Lewalter, 2001; Lewalter & Krapp, 2004). Exceptions are the studies of Hosenfeld, Helmke and Schrader (2002) or Karing (2009). There is, however, hardly any evidence for this topic in the field of vocational education. Some studies show diagnostic competence or diagnostic knowledge to be a special form of expertise that develops in the course of teacher education and professional experience (Dawson, Zeitz & Wright, 1989; Lorenz & Artelt, 2009; Türling, Seifried & Wuttke, 2012). However, it can quite often be found that teacher education seems to play only a minor role in establishing diagnostic competence as students in teacher training programs show a low level of diagnostic competence compared with (experienced) teachers. Rather, this competence seems to be developed with practical

experience through learning by doing and not during a teacher's training (Bruder et al., 2010).

A fairly frequent fundamental question is whether teachers' assessments or grades are accurate and fair or whether they are flawed by a (more or less systematic) bias. The importance of this question becomes clear when we consider the importance of school grades for selection and allocation processes[1] (e.g. Dünnebier, Gräsel & Krolak-Schwerdt, 2009; Helmke, Hosenfeld & Schrader, 2004; Ingenkamp & Lissmann, 2008; Schrader, 2001).

As mentioned above, it is fairly common to use "diagnostic competence" and the competence to assess or evaluate students' achievement interchangeably (Schrader, 2009). In a current study, however, we look at teachers' ability to identify or diagnose mistakes without evaluating their ability to (fairly) assess, judge and grade students' performance.[2] For our study we follow the COACTIV definition (Baumert & Kunter, 2006; Krauss et al., 2008) in which the ability to diagnose or identify, analyze, predict, and deal with mistakes is a central component of diagnostic competence. This is the part of diagnostic competence that overlaps with a central part of a teacher's professional error competence (see the following section).

Professional Error Competence as a Domain-Specific Facet of Diagnostic Competence

A key aspect of teacher professionalism is the ability to diagnose student errors and use them constructively in the classroom. Particularly in the field of business education and accountancy, very little is known about student errors and which competences teachers need in order to handle them constructively. In the past, the general idea that errors can be a learning opportunity was rarely supported (e.g. Weimer, 1925). Nowadays a positive view on errors is prevalent and a key aspect of fostering learning from errors is seen in an "error-friendly" learning environment (Bauer, 2008; Bauer & Harteis, 2012; Fischer et al., 2006; Oser & Spychiger, 2005; Wuttke & Seifried, 2012; Yerushalmi & Pollingher, 2006). Within the field of teaching-learning research, increasing effort has been directed towards identifying error types and the possibility of learning from errors as well as analyzing how teachers' behavior influences students' chances of learning from errors (e.g. Baumert et al., 2010; Heinze, 2004; Seidel & Prenzel, 2007). An essential part of and a first step in supporting learning from errors is a teacher's ability to identify or diagnose the errors made by students. Next, he/she needs adequate strategies to handle the errors and to give feedback. Furthermore, the teacher's belief system with regard to the possibilities and constraints of error learning is important (Figure 1; Türling, Seifried & Wuttke, 2012). We assume that teachers can develop these competences in the course of their training and professional life.

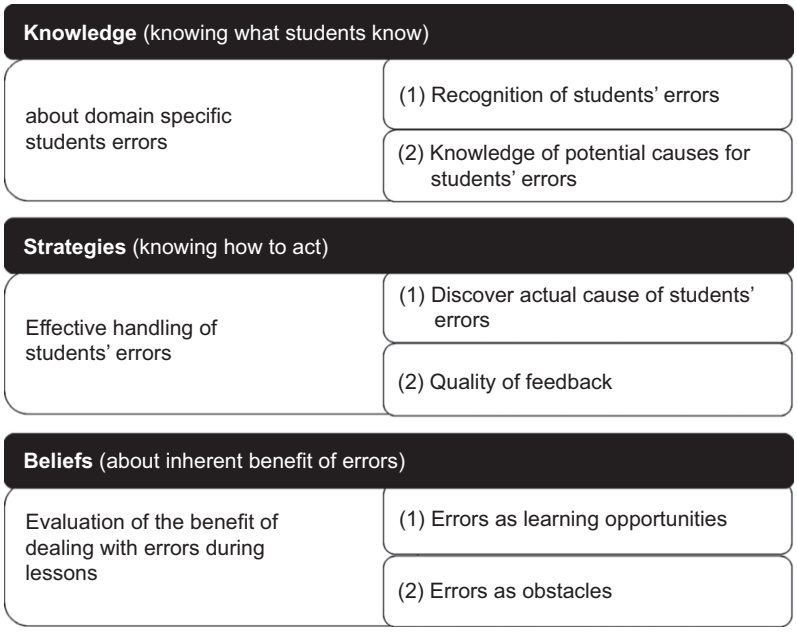

Figure 1. Professional error competence of teachers (Wuttke & Seifried, 2009).

As little is known about the point at which (prospective) teachers acquire knowledge of errors and ways of dealing with errors, we are using a combined cross-sectional and longitudinal design as a way of testing teachers at several stages of their professional development (Seifried & Wuttke, 2010; Wuttke & Seifried, 2009). A specific characteristic of the German teacher education system is that prospective teachers have to complete a Bachelor's degree followed by a Master's degree at university, where they will already take part in didactical and pedagogical courses, and then successfully complete practical training of one-and-a-half or two years before they start to teach without being supervised. The corresponding development processes during professionalization will therefore be considered: Bachelor students, Master students, pre-service teachers, and professional teachers. Apart from the professionalization step we assume that the difficulty of a given task might influence the diagnostic process as well. Initial analysis shows that student errors in "easy" tasks can be identified by practically all participants whereas errors in "difficult" tasks are only found by experienced teachers. The findings reported below (test achievement and comparison across the stages of professionalization) are based on a cross-sectional perspective of the above mentioned stages (longitudinal data are not complete yet) and deal with two questions: (1) "What domain specific knowledge about student errors do the participants have on different stages of their professionalisation," and (2) "Are there differences in the diagnostic competence due to the difficulty of the presented tasks?"

METHOD

Measurement of Professional Error Competence (PEC)

Current discussions and research trends concerning the assessment of competences are, among other things, characterized by preferring behavioral data acquired in performance situations. Therefore, although they provide a lower test diagnostic effort than objective measurement procedures, the importance of self-reports decreases (e.g. Leutner, Hartig & Jude, 2008, pp. 185f.). Furthermore, methodological progress, namely models of Item-Response Theory (IRT), has enhanced the scope of new methods of test design and analysis of behavioral data (e.g. Adams & Wu, 2002; Hartig, 2009; van der Linden & Hambleton, 1996; Wu et al., 2007).

For our purposes of measuring PEC, we refer to a mixed-methods approach (Tashakkori & Teddlie, 2010). To analyze the knowledge of (prospective) teachers about students' errors on the basis of performance data, video vignettes[3] and a paper-and-pencil test[4]have been used. The findings of a preliminary study (interviews with experts, Türling et al., 2011) formed the background for the production of our video vignettes. These vignettes, which show short error situations in the classroom, are used as prompts to test if teachers are able to identify errors and how they respond to them (see Figure 2). During a guided interview the participants have to identify errors and explain how they would react to them in the given situation.

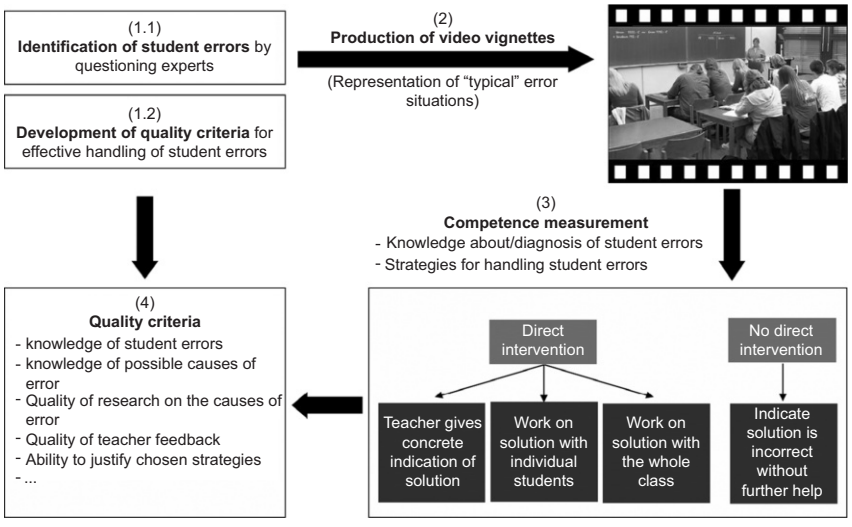

Figure 2. Assessment of competences with video vignettes.

Measurement of task difficulty

To analyze the difficulty of tasks there are two possibilities: post-hoc task analyses and an a priori definition of the features that make a task difficult (Schumann & Eberle, 2011). It is generally preferable to define relevant features a priori as the level of difficulty is easier to interpret in this way for didactic considerations and because a theory- and rule-based development of items is possible (Winther, 2010). However, in the domain of business education there is little evidence as to which features of a task determine the difficulty (exceptions are the studies of Dubs, 2004; Metzger et al., 1993; Nickolaus, Gschwendtner & Geissel, 2008; Winther, 2010; for more detailed information see Schumann & Eberle, 2011). To our knowledge no studies have yet been conducted in the domain of accounting to determine the difficulty of a task. We therefore started with general consider ations gained from research in mathematics and linguistics. Both aspects can be relevant, as tasks in accounting are both language and mathematics based. Analyses of literature result in the following list of features of task difficulty (c.f. Boll, 2011, and Table 1):

Table 1: Features of task difficulty

Defining feature	*Brief description*
Complexity of modeling	Difficulty of a task, determined by the three defining characteristics; replication, ability to make connections between parts, and generalization.
Familiarity with curriculum	Curricular development in mathematics lessons assessed according to the familiarity with the subject; fundamental, basic, and advanced knowledge.
Available extra-mathematical context	Dependent on situation and context of the task.
Extent of assimilation	Finding of new significant and intermediate results, which are not given in the hypothesis.
Pure mathematically based deduction	Assessment of whether processing the model requires explicit mathematical arguments.
Multiple solutions	Openness of the task and room for maneuver in regard to finding solutions.
Cognitive complexity	Number of mental processes to be organized and processed.
Handling of formula	How an (elementary) algebraic repertoire is handled.
Linguistic complexity	Comprehension of the task's texts and the task for editing
Formulating knowledge	Saving intellectual energy by formalizing and extraction or by recording and abstract presentation of formal expressions (terms, equations, functions).
Room for improvisation	Number of possible answers which students can generate.
Level of integration	Understanding single sentences, pieces of text, as well as the text as a whole.
Level of precision	Careful inclusion of all relevant information from the item and text.

Sources: Artelt et al. (2004); Cohors-Fresenborg, Sjuts & Sommer (2004); Neubrand et al. (2002); Schweitzer, (2006)

These general considerations result in six features that should be central in determining the difficulty of accounting tasks:

1. *Setting of the task*: complexity of the relevant information in a task as well as the necessity to trigger existent knowledge and the task's linguistic-logical complexity (three levels: 0 [not complex], 1 and 2).
2. *Content of the task*: number of relevant accounts in a business related case (total number of accounts).
3. *Cognitive cross linking*: interlinking to other learning contents. The more classes of accounts are to be addressed, the more interlinking is necessary; there are eight classes of accounts in the relevant school book (Schmolke & Deitermann, 2009), seven of them are relevant for the item pool, therefore interlinking ranges from 1 to 7.
4. *Special knowledge*: knowledge necessary to solve the task, which is not directly related to accounting (e.g. information about tax rates, exemptions etc.) (three levels: 0, 1 and 2).
5. *Mathematics*: difficulty of applying the necessary mathematical operations (three levels: 0 [nothing to calculate] to 2 [complex mathematical operations]).
6. *Effect of practice*: frequency of relevant accounts (ratio of accounts addressed in the task to accounts used in the entire textbook; e.g. accounts receivables is addressed 165 times in the book, the whole number of accounts used in the book is 2,892, therefore the ratio is 5.7%; the lower the ratio the less an effect of practice can be expected).

The ratings to the six features were added to constitute the difficulty of a given task. The rating was done by two people experienced in accounting. Interrater reliability was satisfying (0.76 to 0.97).

To analyze task difficulty empirically, post-hoc analysis with item response modeling should present an appropriate way to assess how the participants scored in performance tests and to ascertain the level of difficulty of the errors used. Due to the use of dichotomously scored responses such as "correct" and "incorrect" and constraints relating to the sample size, a one-parameter logistic model (1PL, Rasch Model) was chosen in this case (e.g. Hartig, 2009; van der Linden, 2010). Results can be compared with the results achieved through the a priori method. In the first step, however, we do not use the teacher sample because we only have 287 participants solving six tasks. To test our procedure, we therefore use a student sample (N = 657) solving nine accounting tasks. If the procedure proves successful, results will be used to analyze task difficulty concerning the video vignette tasks and the paper-and-pencil test for teachers.

Sample

The data was collected from 287 German (prospective) teachers in the German federal states of Baden-Wuerttemberg and Hessen in 2010/11. The participants from

stages 1 and 2 are in teacher training programs at the universities of Konstanz and Frankfurt. The pre-service teachers attend their practical training at teacher education institutes, and the professional teachers are employed in commercial schools.

Table 2. Sample teacher education (n = 287)

		Sex		*Age*		*Term/professional Experience*	
Stage	*N*	*Female*	*Male*	*M*	*SD*	*M*	*SD*
1-Teacher Training (Bachelor)	80	46	34	23.7	3.77	3.65	1.68
2-Teacher Training (Master)	78	53	25	26.8	4.87	2.31	.99
3-Practical Training	74	32	42	28.9	3.66	.38	.26
4-Professional Teachers	55	33	22	33.0	4.75	3.84	1.83

With the exception of stage 3, the gender distribution is slightly unbalanced in favor of female participants. The Bachelor students have an average age of 24 years and are in the middle of their undergraduate studies, the Master students are about three years older and close to graduation. The participants in stage 3 are about 29 years old and mostly at the beginning of their practical training, while the professional teachers have an average age of about 33 and an average of about four years teaching experience. The number of participants in the sample groups is slightly unbalanced because data sampling in stage 4 is still incomplete.

To analyze task difficulty we used a student sample (N = 657) from Hessen (N = 225) and Baden-Wuerttemberg (N = 432). Of the participants 382 were male, 275 female. Their age was between 15 and 40 years with a median of 18 years. All attended vocational school (commercial high school 196, dual vocational school 291, vocational college 170). Data was collected during the last year of schooling, therefore all participants should be able to solve the tasks.

FINDINGS

Test Achievement and Comparison Across the Stages of Professionalisation

Figure 3 shows a detailed breakdown of how the participants (sorted by their stage of professionalization) scored in the tests (relative to frequencies of correct item responses within their subgroup). To analyze possible differences between the four groups a chi-square test (df = 3) was used. The two vignette related tasks show that the first task (all groups had correct responses of about 80%) is apparently easier to handle than the second task. However, the professional teachers scored high in both tasks. Thus, task Vignette 2 provides significant differences ($\chi^2 = 70.022$; $p = 0.000$). A look at the items related to the paper-and-pencil test shows that the first task (Paper-pencil 1) can be considered as being on a lower difficulty level with only a slight statistical difference between groups ($\chi^2 = 13.926$; $p = 0.003$). The analysis

of the other three items revealed that Bachelor and Master students, as well as pre-service teachers, achieved a rather low score. Here the professional teachers once again scored (significantly) higher in the test (Paper-pencil 2: $\chi^2 = 34.9917$; Paper-pencil 3: $\chi^2 = 17.632$; Paper-pencil4: $\chi^2 = 37.165$; $p = 0.000$ for all three items). With the exception of the two obviously easier tasks (Vignette 1 & Paper-pencil 1), participants in the three earlier professionalization steps do not differ substantially and achieve a rather low score. This indicates that they failed to recognize many errors. However, the professional teachers clearly outperformed the other groups. Comparison of the average achievement of the four groups over all tasks showed significant differences, which explains nearly 27% of variance ($F = 34.046$; $p = 0.000$; $\eta^2 = 0.265$). A linear increase in performance related to the different stages could not be found.

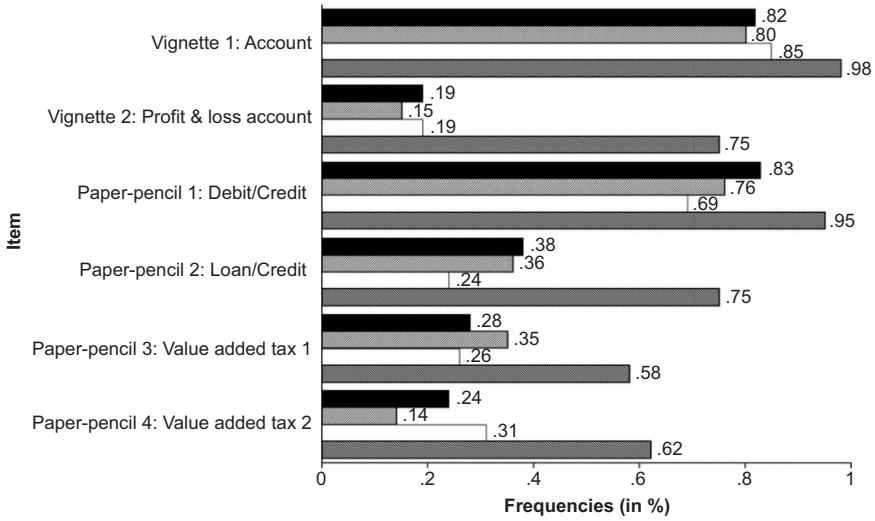

Figure 3. Chi-square test: Correct item responses within subgroup (n = 287).

Task difficulty

As mentioned above, experienced teachers generally score better than students and teachers in practical training. It is also shown that in some tasks the differences between the two groups (experienced teachers on one side and students and teachers in practical training on the other) are larger than in other tasks (e.g. in the second vignette task, Vignette 2). This suggests that the ability to diagnose errors could be – at least partly – dependent on task difficulty. For the empirical analysis we chose nine tasks out of the pool described above. Following the above mentioned rationale, three of them were classified as difficult, three as intermediately

difficult and three as easy. Dichotomous coding of the findings (correctly/incorrectly solved) was used for the analysis and evaluation. The empirical determination of the task's difficulty results from the parametrically logistical Rasch model (Rasch, 1960) which follows the principle of specific objectivity (e.g Rost, 2004), i.e. items can be compared according to their difficulty, independent from the sample that solved them.

For empirical determination of the task difficulty, the data was adjusted to the one-parametric logistic Rasch model. Thereby, three items had to be eliminated due to missing one-dimensionality (revision of every item via the Wald test).[5] A retesting of the model gave a satisfactory adjustment to the model (p-value: 0.655 for the criteria for differentiation median). Therefore it was possible to determine the item parameter. The following task difficulties could be detected:

Table 3. Item content and task difficulty

Item Number	*Item Content*	*Task Difficulty*
Item 1	Cash deposit in bank account	–1.9503133
Item 2	Debit/credit	–2.8294071 (easiest item)
Item 3	Outgoing invoice	2.1485848
Item 4	Mortgage interests and accrual	2.843303 (most difficult item)
Item 5	Depreciation/book value	1.4522982
Item 6	Discounts	2.1485848

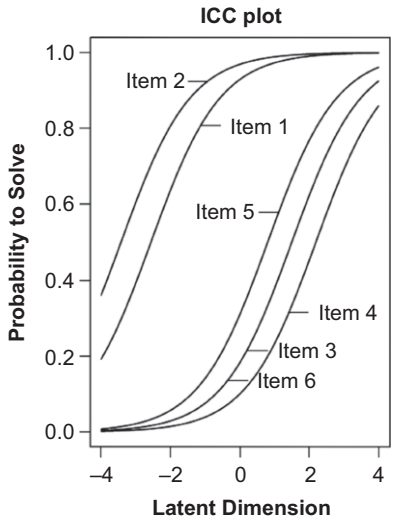

Figure 4. Task difficulty. (Item 3 and 6 have the same level of difficulty; therefore they overlap in the graphic)

The difficulty of an item is defined by the position of the item-characteristic curve (ICC) relative to the x-axis. The x-axis gives the specific characteristics and the y-axis the probability of solving a task. The ICC illustrates the likelihood of solving a task as a function of the personal parameter (ability). The difficulty of a task can be defined by the point of inflection of the curve, at which the probability of solving an item is 50%. At this point the ability of a person is equal to the task difficulty. Items with a curve progression on the left are easier and those on the right side are more difficult. Therefore, the probability of solving a task increases with the increase in skills (cf. Rost, 2004).

By ranking and comparing the items by their theoretical and empirical complexity, the following results are found (Figure 5):

Rank	*Item (empirically)*	*Item (theoretically)*
1	2	2
2	1	3
3	5	6
4	3/6	5
5	---	1
6	4	4

Figure 5. Comparison of ranks according to empirical and theoretical analysis.

DISCUSSION

Returning to the focus and the research questions presented in the beginning we can state:

1. *Knowledge about student errors*: the ability to identify and to correct errors (also in relation to the professionalization step) of both students and pre-service teachers can, all in all, be seen as rather low. Obviously, school-relevant content cannot be applied in an adequate way. This could be due to the fact that students quite often acquire inert knowledge which they cannot use or apply in their professional life (Gruber & Renkl, 2000). In contrast, the professional teachers scored very high in the tests, consequently generating significant differences. However, there is no linear positive relation between the stage of professionalization and achievement in the tests.
2. The difficulty of a task plays a potential role with regard to identifying students' errors. The logic behind the analysis determining a task's difficulty is currently undergoing testing. Furthermore, it is problematic that in the present sample size there are few one-dimensional items which could be analyzed. Nevertheless, the findings up to now support theoretical considerations. Further research is planned with a larger student sample size and a more in-depth task analysis. If the current findings can be confirmed, research will be undertaken into how far and whether the difficulty of a task can be differentiated by identifying students' errors.

NOTES

[1] Many studies show that various effects can get in the way of fair grades, e.g. the "Big-Fish-Little-Pond" effect (or reference group effect, Marsh, 1987) or anchoring (Dünnebier, Gräsel & Krolak-Schwerdt, 2009).

[2] The joint project is funded by the German Federal Ministry of Education and Research (Framework Program for the Promotion of Empirical Educational Research; funding codes: 01JH0921, University of Frankfurt, and 01JH0922, University of Mannheim).

[3] Using video vignettes to generate performance data has several advantages (e.g. Barter & Renold, 1999; Jüttner & Neuhaus, 2010; Seguin & Ambrosio, 2002; Veal, 2002). Firstly, vignettes provide a stimulus that requires situational decisions almost like in a real classroom. But in contrast to video-recording of real classroom situations, the production of vignettes with professional actors ensures standardized conditions for the tests and one is able to vary and show typical errors that actually should be investigated. Weaknesses of this instrument could be seen in social desirability, or that the vignettes do not show a real classroom setting.

[4] The participants have to identify and correct errors within a given time (speed test: ten minutes).

[5] An assumption of the Rasch model is one-dimensionality. This means that the item only covers one dimension, in our case the ability to book and not for example, the gender (different items should not be easier to solve for males than for females).

REFERENCES

Adams, R. J., & Wu, M. (2002). *PISA 2000 Technical Report*. Paris: OECD.

Artelt, C., & Gräsel, C. (2009). Gasteditorial. Diagnostische Kompetenz von Lehrkräften [Diagnostic Competence of Teachers]. *Zeitschrift für Pädagogische Psychologie*, *23*(3–4), 157–160.

Artelt, C., Stanat, P., Schneider, W., Schiefele, U., & Lehmann, R. (2004). Die PISA-Studie zur Lesekompetenz: Überblick, differenzierte Analysen und Einordnung der Befunde [The PISA Reading Literacy Survey: overview, detailed analysis and classification of the findings]. In U. Schiefele, C. Artelt, W. Schneider, & P. Stanat (Eds.) *Entwicklung, Bedingungen und Förderung der Lesekompetenz Jugendlicher – Vertiefende Analysen der PISA-2000-Daten*. Wiesbaden: VS Verlag, 139–168.

Barter, C., & Renold, E. (1999). The Use of vignettes in Qualitative Research. *Social Research Update, 25*, 1–6.

Bauer, J. (2008). *Learning from Errors at Work. Studies on Nurses' Engagement in Error Related Learning Activities.* Doctoral Dissertation, University of Regensburg, Regensburg. Retrieved 19.04.2012 from http://epub.uni-regensburg.de/10748/1/diss_veroeff_endversion.pdf.

Bauer, J., & Harteis, C. (2012) (Eds.) *Human fallibility – The ambiguity of errors for work and learning*. Dordrecht: Springer.

Baumert, J., Klieme, E., Neubrand, M., Prenzel, M., Schiefele, U., Schneider, W., Stanat, P., Tillmann, K.-J., & Weiß, M. (Eds.) (2001). *PISA 2000. Basiskompetenzen von Schülerinnen und Schülern im internationalen Vergleich* [PISA 2000. An International Comparison of Students' Fundamental Competences]. Opladen: Leske + Budrich.

Baumert, J., & Kunter, M. (2006). Stichwort: Professionelle Kompetenz von Lehrkräften [Keyword: Professional Competence of Teachers]. *Zeitschrift für Erziehungswissenschaft*, *9,* 469–520.

Baumert, J., Kunter, M., Blum, W., Brunner, M., Voss, T., Jordan, A., Klusmann, U., Krauss, S., Neubrand, M., & Yi-Miau, T. (2010). Teachers' Mathematical Knowledge, Cognitive Activation in the Classroom, and Student Progress. *American Educational Research Journal*, *47*(1), 133–180.

Boll, M. (2011). *Der Schwierigkeitsgrad von Buchungssätzen*. [The Complexity Level of Booking Records] Unveröffentlichte Masterarbeit. Goethe-Universität Frankfurt.

Bruder, S., Klug, J., Hertel, S., & Schmitz, B. (2010). Messung, Modellierung und Förderung der Beratungskompetenz und Diagnostischen Kompetenz von Lehrkräften [Measuring, Modeling and Advancement of Teachers' Advisory Skill and Diagnostic Competence]. In K. Beck, & O. Zlatkin-Troischanskaia (Eds.) *Themenheft, Lehrerbildung auf dem Prüfstand*. Landau: Empirische Pädagogik, 173–195.

Brunner, M., Anders, Y., Hachfeld, A., & Krauss, S. (2011). Diagnostische Fähigkeiten von Mathematiklehrkräften [Diagnostical Skills of Mathematics Teachers]. In M. Kunter, J. Baumert, W. Blum, U. Klusmann, S. Krauss, & M. Neubrand (Eds.) *Professionelle Kompetenz von Lehrkräften. Ergebnisse des Forschungsprogramms COACTIV*. Münster: Waxmann, 215–234.

Cohors-Fresenborg, E., Sjuts, J., & Sommer, N. (2004). Komplexität von Denkvorgängen und Formalisierung von Wissen [Complexity of Thinking Processes and Formalisation of Knowledge]. In M. Neubrand (Eds.) *Mathematische Kompetenzen von Schülerinnen und Schülern in Deutschland*. Wiesbaden: VS Verlag, 109–144.

Dawson, V. L., Zeitz, C. M., & Wright, J. C. (1989). Expert-Novice Differences in Person Perception: Evidence of Experts' Sensitivities to the Organization of Behavior. *Social Cognition, 7*, 1–30.

Desimone, L. M. (2009). Improving Impact Studies of Teachers' Professional Development: Toward Better Conceptualizations and Measures. *Educational Researcher, 38*(3), 181–199.

Dubs, R. (2004). Bildungsstandards – ein erfolgversprechender Paradigmawechsel? Ein Umsetzungsversuch als Diskussionsgrundlage im Fach Volkswirtschaftslehre [Education Standards- a Promising Paradigm Shift? An Implementation Trial as a Basis for Discussion in the Subject of Economics]. In M. Wosnitza et al. (Eds.) *Lernprozess, Lernumgebung und Lerndiagnostik. Wissenschaftliche Beiträge zum Lernen im 21. Jahrhundert*. Landau: Empirische Pädagogik, 38–55.

Dünnebier, K., Gräsel, C., & Krolak-Schwerdt, S. (2009). Urteilsverzerrungen in der schulischen Leistungsbeurteilung: Eine experimentelle Studie zu Ankereffekten. [Biases in Teacher's Assessments of Student Performance: An Experimental Study on Anchoring] *Zeitschrift für Pädagogische Psychologie, 23*, 187–195.

Fischer, M. A., Mazor, K. M., Baril, J., Alper, E., DeMarco, D., & Pugnaire, M. (2006). Learning from Mistakes. Factors that Influence how Students and Residents Learn from Medical Errors. *Journal of General Internal Medicine*, *21*(5), 419–423.

Graeber, A., & Tirosh, D. (2008). Pedagogical Content Knowledge: Useful Concept or Elusive Notion. In P. Sullivan, & T. Woods (Eds.) *The International Handbook of Mathematics Teacher Education. Vol. 1: Knowledge and Beliefs in Mathematics Teaching and Teaching Development*. Vol. 1. Rotterdam: Sense Publisher, 117–132.

Gruber, H., & Renkl, A. (2000). Die Kluft zwischen Wissen und Handeln: Das Problem des trägen Wissens [The Gap Between Knowledge and Action: The Problem of Inert Knowledge] In G. H. Neuweg (Eds.) *Wissen – Können – Reflexion*. Innsbruck: Studien-Verlag, 155–175.

Hartig, J. (2009). Messung der Kompetenzen von Lehrpersonen mit Modellen der Item-Response-Theorie [Measuring the Competencies of Teachers Using Item-Response-Theory Models] In O. Zlatkin-Troitschanskaia, K. Beck, D. Sembill, R. Nickolaus, & R. Mulder (Eds.) *Lehrerprofessionalität – Bedingungen, Genese, Wirkungen und Messung*. Weinheim: Beltz, 295–310.

Heinze, A. (2004). Zum Umgang mit Fehlern im Unterrichtsgespräch der Sekundarstufe I. Theoretische Grundlegung, Methode und Ergebnisse einer Videostudie [Handling of Errors in Classroom Discussions in Secondary Level I. Theoretical Foundation, Method and Results of a Video Study]. *Journal für Mathematik-Didaktik, 25*, 221–245.

Helmke, A., Hosenfeld, I., & Schrader, F.-W. (2004). Vergleichsarbeiten als Instrument zur Verbesserung der Diagnosekompetenz von Lehrkräften [Comparative Tests as an Instrument to Improve the Diagnostic Skills of Teachers]. In R. Arnold, & C. Griese (Eds.) *Schulleitung und Schulentwicklung*. Hohengehren: Schneider, 119–143.

Hill, H. C., Ball, D. L., & Schilling, S. G. (2008). Unpacking Pedagogical Content Knowledge: Conceptualizing and Measuring Teachers' Topic-Specific Knowledge of Students. *Journal for Research in Mathematics Education*, *39* (4), 372–400.

Hollenweger, J. (2011). Teachers' Ability to Assess Students for Teaching and Supporting Learning. *Prospects. 41* (3), 445–457.

Hosenfeld, I., Helmke, A., & Schrader, F.-W. (2002). Diagnostische Kompetenz: Unterrichts- und lernrelevante Schülermerkmale und deren Einschätzung durch Lehrkräfte in der Unterrichtsstudie SALVE [Diagnostic Competence: Relevant Lecture and Study Attributes of Students and Teachers' Evaluation of Them During the SALVE Study] In M. Prenzel, & J. Doll (Eds.) *Bildungsqualität von Schule: Schulische und außerschulische Bedingungen mathematischer, naturwissenschaftlicher und überfachlicher Kompetenzen*. Weinheim, 65–82.

Ingenkamp, K., & Lissmann, U. (2008). *Lehrbuch der Pädagogischen Diagnostik* [Textbook Educational diagnostics] (6. Aufl.). Weinheim: Beltz.

Jüttner, M., & Neuhaus, B. J. (2010). Using Empirically Analyzed Pupils' Errors to Develop a PCK test. In M. F. Taşar, & G. Çakmakci (Eds.) *Contemporary Science Education Research: Pre-Service and In-Service Teacher Education*. Ankara: Pegem Akademi, 331–340.

Karing, C. (2009). Diagnostische Kompetenz von Grundschul- und Gymnasiallehrkräften im Leistungsbereich und im Bereich Interessen [Diagnostic Competence of Elementary and Secondary School Teachers in the Domains of Competence and Interests]. *Zeitschrift für Pädagogische Psychologie, 23*, 197–209.

Kultusministerkonferenz (KMK) (2004). *Standards für die Lehrerbildung: Bildungswissenschaften* [Competencies and Standards for Teacher Training]. Beschluss der Kultusministerkonferenz vom 16.12.2004. Retrieved 15.03.2012 from http://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2004/2004_12_16-Standards-Lehrerbildung.pdf.

Krapp, A., & Lewalter, D. (2001). Development of Interests and Interest-based Motivational Orientations. A Longitudinal Study in Vocational School and Work Settings. In S. Volet, & S. Järvelä (Eds.) *Motivation in Learning Contexts: Theoretical and Methodological Implications*. London: Elsevier, 209–232.

Krauss, S., Brunner, M., Kunter, M., Baumert, J., Blum, W., Neubrand, M., & Jordan, A. (2008). Pedagogical Content Knowledge and Content Knowledge of Secondary Mathematics Teachers. *Journal of Educational Psychology*, *100*, 716–725.

Leutner, D., Hartig, J., & Jude, N. (2008). Measuring Competencies: Introduction to Concepts and Questions of Assessment in Education. In J. Hartig et al. (Eds.) *Assessment of Competencies in Educational Contexts*. Göttingen: Hogrefe, 177–192.

Lewalter, D., & Krapp, A. (2004). The Role of Contextual Conditions of Vocational Education for Motivational Orientations and Emotional Experiences. *European Psychologist, 9*(4), 210–221.

Lorenz, C., & Artelt, C. (2009). Fachspezifität und Stabilität diagnostischer Kompetenz von Grundschullehrkräften in den Fächern Deutsch und Mathematik. [Domain Specificity and Stability of Diagnostic Competence Among Primary School Teachers in the School Subjects German and Mathematics] *Zeitschrift für Pädagogische Psychologie, 23*, 211–222.

Marsh, H. W. (1987). The big-fish-little-pond effect on academic self-concept. *Journal of Educational Psychology, 79,* 280–295.

Metzger, C., Waibel, R., Henning, C., Hodel, M., & Luzi, R. (1993). *Anspruchsniveau von Lernzielen und Prüfungen im kognitiven Bereich*. [Aspiration Level of Educational Objective and Examinations in the Field of Cognitive Processes]. St. Gallen: Universität St. Gallen.

Neubrand, M., Klieme, E., Lüdtke, O., & Neubrand, J. (2002). Kompetenzstufen und Schwierigkeitsmodelle für den PISA-Test zur mathematischen Grundbildung [Degrees of Competence and Models of Difficulty for the PISA-test of Mathematical Literacy]. *Unterrichtswissenschaft*, *30*(2), 100–119.

Nickolaus, R., Gschwendtner, T., & Geissel, B. (2008). Entwicklung und Modellierung beruflicher Fachkompetenz in der gewerblich-technischen Grundbildung [Developments and Modeling of Occupational Competencies During Industrial-Technical Basic Training]. *Zeitschrift für Berufs- und Wirtschaftspädagogik*, 1, 48–73.

Oser, F., & Spychiger, M. (2005). *Lernen ist schmerzhaft. Zur Theorie des negativen Wissens und zur Praxis der Fehlerkultur* [Academical Studying is Painful. Theory of Negative Knowledge and Error Culture in Practice]. Weinheim: Beltz.

Rasch, G. (1960). *Probabilistic Models for Some Intelligence and Attainment Tests.* Copenhagen: Nielsen & Lydiche.

Rost, J. (2004). *Lehrbuch Testtheorie – Testkonstruktion* [Test Theory, Test Construction] (2. Ed.). Bern: Huber.

Schmolke, S., & Deitermann, M. (2009). *Rechnungswesen des Groß- und Außenhandels* [Accounting in Wholesale and Foreign Trade]. (23., aktualisierte Aufl.). Braunschweig: Winklers.

Schrader, F.-W. (2001). Diagnostische Kompetenz von Eltern und Lehrern [The Diagnostic Competence of Parents and Teachers]. In D. H. Rost (Eds.) *Handwörterbuch Pädagogische Psychologie* (2. Ed.). Weinheim: Beltz, 91–96.

Schrader, F.-W. (2009). Anmerkungen zum Themenschwerpunkt „Diagnostische Kompetenz von Lehrkräften“ [The Diagnostic Competency of Teachers]. *Zeitschrift für Pädagogische Psychologie, 23*, 237–245.

Schumann, S., & Eberle, F. (2011). Bedeutung und Verwendung schwierigkeitsbestimmender Aufgabenmerkmale für die Erfassung ökonomischer und beruflicher Kompetenzen [Meaning and Application of Difficulty Determining Task Attributes in the Assessment of Economical and Vocational Competencies]. In U. Faßhauer, B. Fürstenau, & E. Wuttke (Eds.) *Grundlagenforschung zum Dualen System und Kompetenzentwicklung in der Lehrerbildung*. Opladen: Budrich, 77–89.

Schwarz, B., Wissmach, B., & Kaiser, G. (2008). „Last Curves not Quite Correct“: Diagnostic Competences of the Future Teachers with Regard to Modelling and Graphical Representations. *ZDM Mathematics Education, 40,* 777–790.

Schweitzer, K. (2006). *Der Schwierigkeitsgrad von Textverstehensaufgaben* [The Complexity Factor of Textual Comprehension Exercises]. Frankfurt: Peter Lang.

Seidel, T., & Prenzel, M. (2007). Wie Lehrpersonen Unterricht wahrnehmen und einschätzen – Erfassung pädagogisch-psychologischer Kompetenzen mit Videosequenzen [How Teachers Perceive Lessons – Assessing Educational Competencies by Means of Videos]. *Zeitschrift für Erziehungswissenschaft*, *Sonderheft 8*, 201–216.

Seifried, J., & Wuttke, E. (2010). Students' Errors: how Teachers Diagnose them and how they Respond to them. *Empirical Research in Vocational Education and Training (ERVET), 2* (2), 5–21.

Seguin, C. A., & Ambrosio, A. L. (2002). Multicultural Vignettes for Teacher Preparation. *Multicultural Perspectives, 4,* 10–16.

Shulman, L. S. (1986). Those who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4–14.

Tashakkori, A., & Teddlie, C. B. (2010). *Handbook of Mixed Methods in Social and Behavioural Research (2nd ed.)*. Thousand Oaks: Sage Publications.

Türling, J. M., Seifried, J., & Wuttke, E. (2012). Teachers' Knowledge About Domain Specific Student Errors. In E. Wuttke, & J. Seifried (Eds.) *Learning from Errors at School and at Work*. Opladen: Barbara Budrich, 95–110.

Türling, J. M., Seifried, J., Wuttke, E., Gewiese, A., & Kästner, R. (2011). ‚Typische' Schülerfehler im Rechnungswesenunterricht – Befunde einer Interviewstudie [‚Typical' Student Errors in Accounting Lessons – Findings of an Interview Study]. *Zeitschrift für Berufs- und Wirtschaftspädagogik*, *107* (3), 390–407.

van der Linden, W. J. (2010). Item Response Theory. In B. McGraw, P. L. Peterson, & E. Baker (Eds.) *International Encyclopedia of Education* (3rd ed.). Oxford: Elsevier, 81–89.

van der Linden, W. J., & Hambleton, R. K. (1996). *Handbook of Modern Item-Response Theory*. Berlin: Springer.

van Driel, J. H., & Berry, A. (2010). The Teacher Education Knowledge Base: Pedagogical Content Knowledge. In B. McGraw, P. L. Peterson, & E. Baker (Eds.) *International Encyclopedia of Education* (3rd ed.). Oxford: Elsevier, 656–661.

Veal, W. R. (2002). Content Specific Vignettes as Tools for Research and Training. *Electronic Journal of Science Education, 6* (4), 1–37.

Vogt, F., & Rogalla, M. (2009). Developing Adaptive Teaching Competency Through Coaching. *Teaching and Teacher Education, 25*, 1051–1060.

Weimer, H. (1925). *Psychologie der Fehler*. Leipzig: Klinkhardt.

Winther, E. (2010). *Kompetenzmessung in der beruflichen Bildung* [Measuring Competence In Vocational Education]. Bielefeld: Bertelsmann.

Wu, M. L., Adams, R. J., Wilson, M., & Haldane, S. A. (2007). *ACER ConQuest. Version 2.0. Generalised Item Response Software.* Camberwell: ACER Press.

Wuttke, E., & Seifried, J. (2009). Diagnose von und Umgang mit Schülerfehlern als Facette der professionellen Kompetenz von Lehrkräften – Skizze eines Forschungsprojekts [Diagnosis and Handling of Student Errors as a Facet of Teacher's Professional Competence – Outline of a Research Project]. In E. Wuttke, H. Ebner, B. Fürstenau, & R. Tenberg (Eds.) *Erträge und Perspektiven berufs- und*

wirtschaftspädagogischer Forschung. Schriftenreihe der Sektion Berufs- und Wirtschaftspädagogik der Deutschen Gesellschaft für Erziehungswissenschaft (DGfE). Opladen: Barbara Budrich, 45–54.
Wuttke, E., & Seifried, J. (2012) (Eds.). *Learning from Errors at School and at Work*. Opladen: Barbara Budrich.
Yerushalmi, E., & Pollingher, C. (2006). Guiding Students to Learn from Mistakes. *Physics Education*, *41*, 532–538.

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STANDARDIZING ORAL EXAMINATIONS IN VOCATIONAL EDUCATION AND TRAINING

Potentials and Limits

STANDARDIZATION – AN ATTEMPT RELATED TO VALIDITY

Klaus Breuer, by developing and implementing the customer consultation as an oral examination in the field of basic vocational education and training (VET) for insurance sales agents, significantly contributed to the legitimacy and contemporary design of oral exams in VET in general and particularly in Germany (see Borch et al., 2006; Institut für Wirtschaftspädagogik, Landesstiftung Baden-Württemberg & Baden-Württembergischer Handwerkstag e.V., n.d.; Reetz & Hewlett, 2007; Schmidt, 2000) as well as in Switzerland (see Berufsbildungsverband der Versicherungswirtschaft [VBV], n.d.a; Interessen-gemeinschaft Kaufmännische Grundbildung [igkg.ch], n.d.).

On the one hand, Breuer took the centuries-old tradition of oral exams in secondary and tertiary education, at least in German-speaking Europe, and applied the idea to the dual VET, which is mainly justified by two validity-oriented reasons. First, in the relevant literature, the conversation between examinee and examiner is considered to be a relatively valid way of depicting the reality of communication situations and revealing the cognitive processes of examinees (Metzger & Nüesch, 2004, p. 103). Second, Breuer (2000, pp. 101–102) stressed that, in relation to VET, the oral examination can succeed in eliciting a comprehensive, professional, self-directed qualified action in an authentic context, i.e. oriented to "real workplace tasks" (p. 156). On the other hand, Breuer diminishes the impact of repeatedly stated concerns regarding the reliability and validity of oral examinations (Ingenkamp & Lissmann, 2008, pp. 137–142; see also Kehm, 2001; Kirk, 2004, pp. 39–46; Memon, Joughin & Memon, 2010, pp. 278–279) by developing and recommending the standardization of customer consultation instruments, simulated in the form of role-plays. The specific features of these are the definition of the situation and behavior of the examiner in the role of a customer by "some cornerstones of a customer scenario" within an "open case" (Breuer, 2002, p. 159) and the guidance of observing and grading the "performance of the candidate" through the use of "templates and a procedure supplied to the examiners" (p. 160), so-called rubrics. Similar standardization efforts can be found in various forms of oral examination from the above-mentioned German and Swiss sources. In the international context, the practice is especially

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 241–254.

pronounced in practical oral examinations for medical students in the form of objective structured clinical examinations (OSCE) (Harden & Gleeson, 1979; Norgini, 2005; Schrauth, Schmulius, Zipfel & Haarmeier, 2006).

Efforts to standardize oral examinations can certainly be countered by the argument that any consultation situation is inherently unique, firstly because of the variety of situations that can occur in reality (from the full sales process to the negotiation inherent in any discussion to the simple providing of information) and secondly because of the interaction that characterizes any oral examination. As Halfpap (1994), with respect to the interaction between an examinee and three examiners, describes the issue: "Given that everyone (including the examiners) has his or her own individual personality, which affects the current situation of each subject, so does it have an effect in each of the varied situations in which people are involved. Everyone takes the same situation and perceives and interprets it differently." (p. 156; transl.).

It is exactly these standardization efforts, as related to questions of oral examinations in VET, that will be scrutinized. To what extent and in which direction could the standardization of current or conceivable oral examination formats influence their validity? How great really is the potential for standardization, including with instruments such as rubrics, and what are the limits or even dangers? In this article, this issue is to be judged on a macro level following a situation-potential model, and on a micro level with regard to the design of oral examinations within the framework of a given examination format.

STANDARDIZATION IN LIGHT OF A SITUATION-POTENTIAL MODEL

Standardization of oral examinations assumes – in our context – that young professionals face similar communication situations and by this need to possess and show the same potential or competencies. In terms of a lowest common denominator of current definitions (compare with Sloane, 2008), competencies demonstrate "the internal potential or repertoire of a person to cope with certain situations. But competency reflects inner potential only in interaction with the situation" (Metzger, 2011, p. 384; transl.).

Oral Communications From the Situation Perspective

Therefore we must ask how and where to position oral examinations *in relation to situations*. According to everyday experience as well as current, relevant "competency-based" curriculum fundamentals (*Ausbildungsordnungen*, *Rahmenlehrpläne*, *Bildungspläne*; see for Germany e.g. Breuer, 2002, p. 154; see for Switzerland e.g. Bundesamt für Berufsbildung und Technologie [BBT], n.d., VBV, n.d.b.), young workers must, at the end of their apprenticeship, be able to communicate orally with people (customers, employees, managers) in their domain-specific functions (as, for example, hairdresser, mechatronic systems specialist, painter, bank clerk, cook) in

situations that present varying levels of complexity and familiarity (with respect to content, ways of looking at problems, solution horizons, context, quality of services, autonomy of action; Dörner, 1976; Sloane, 2008, p. 501). First, they must communicate in a way that is domain specific and appropriate to the situation but also – and inexorably linked – demonstrate proper use of language. Second, it is important to distinguish and differentiate – with some overlap – between two strands of activity; oral-practical and oral-theoretical (conceptual).

There are typically two forms of *oral-practical activity*: *First*, in sales or consulting conversations, the young worker aims, as a salesperson or consultant (whether fashion consultant, hairstylist, electrician or insurance sales agent) in dialogue with external or internal customers, to arrive at the sale of a product or service, to solve a problem, or to make recommendations about a product (and similar). This discussion can be either a comprehensive, professional, self-directed qualified action, in which oral communication is the key constitutive feature – which is typical in the case of a sale – or be integrated into a more comprehensive practical action, in which oral communication is only one, and often a less central, part (for example, when a craftsman explains a previously manufactured product to the customer, a hairstylist gives the customer care advice, or a waiter comments on the food served to a guest). *Second*, using a presentation, the worker seeks to inform interested parties (for example, employees, customers, experts) about a topic or convince them of something – anything from reading a text to presenting a project or product.

Oral-theoretical activity is typically expressed in so-called subject or expert consultations. Here, the young worker aims to engage internally with employees or supervisors or externally with interested laypeople or experts in an interactive dialogue in order to make his or her concrete practical actions "visible", such as to reflect on the process and results of, for instance, creating a product or completing an order, perhaps even discussing the previously mentioned sales or consulting conversations or conducting a presentation. This can occur, depending on focus and appropriateness to the situation, prior to, during, or after the practical activity. Or, the professional can attempt, separate from the concrete practical action, to show his or her knowledge, to solve problems for someone, or work with someone to lead a discussion (or similar).

The various communication situations that young professionals face necessarily call for *corresponding variations of oral examinations*. At the same time, they can be typified or standardized according to the type of communication situation to be examined. This requirement is satisfied in examination practice, in that the BiBB (2006, pp. 14–15) recommends a variety of formats (job-related, situational, and case-related technical discussion, consultation simulation, and presentation). This differentiation aids in making oral examinations more transparent and, at an operational level, in designing them appropriately. However, two dangers of excessive standardization can be identified. First, because of typification of communication situations, overlaps among the appropriate examination formats, fluid transitions and combinations of practice-relevant situations may be lost from view. Further, there is

a tendency to provide an entire professional group or even several examinees with the same examination form (for example, sales or consulting conversations using role playing; for Berufsgruppe Dienstleistung und Administration in Switzerland, see igkg.ch, n.d.), even if it would better approximate the professional practice to provide different or even multiple domain-specific examination formats with different emphases. For the use of rubrics, it follows that they must be specifically developed at least for each distinct communication situation and the corresponding format of the oral examination.

Oral Communications from the Perspective of Potential

Based on the situation potential model, the main question now is, *from the perspective of potential*, what kind of potential or repertoire of competencies is required to master the different communication situations previously mentioned and that can or should be recognized through the use of appropriate examination formats?

As a learning-theory approach to the determination of potential or competency, the distinction between three *learning or competency domains* has been used for decades: the cognitive (knowing and thinking), affective (motivation, will, values), and psychomotor (perceiving and physically moving) (Anderson et al., 2001, p. 258; Popham, 2009, pp. 79–81). The cognitive domain has become the most commonly and widely used differentiation by the taxonomy of Benjamin Bloom and colleagues (1956) or its revised version respectively (Anderson et al., 2001) – not least because it is significant for the knowledge-based society and therefore central to instruction and assessment. According to this taxonomy, it is postulated that, depending on the situation, various threads of complex knowledge and intense cognitive processes must work together: Declarative knowledge (what?) about facts and concepts, procedural and conditional knowledge (how, when, why?) and metacognitive knowledge (about situations, one's own cognition and person in general, as well as about other persons) are all necessary, on the one hand, while, on the other hand, the individual is engaged in the cognitive processes of remembering, understanding, applying, analyzing, evaluating, and discrete creating (Metzger, 2011, p. 385).

In this taxonomy, distinct communication situations can be localized. Both oral-practical and oral-theoretical conceptual activity are necessary, in each case a combination of knowledge and cognitive thought processes, including the specific spoken language and non-verbal communication (gestures, facial expressions), even if the latter is strongly influenced by psychomotor. This also makes it clear that action, even if it is, in our context, ultimately perceived as situation-oriented, cannot be separated from competence. Actions are constituted of the combination of knowledge and thinking (Breuer & Höhn, 1999, p. 23; Reetz & Hewlett, 2007, p. 41; Straka, 2000, p. 81). This is exemplified in the sales situation, where the sales assistant, on the one hand, must rely on declarative factual and conceptual knowledge (e.g., product, stylistics, customer types, business goals) and procedural knowledge regarding design and conduct of a sales interaction, as well as metacognitive knowledge (e.g.

one's own strategies used in similar sales situations and communicative verbal and non-verbal principles). On the other hand, he or she must, in terms of cognitive processes, be able to draw on this knowledge, at least to remember, understand, and apply it – and, if it is a relatively novel situation, be able to deal with problems by analyzing, evaluating, and creating, as well as drawing on previous knowledge and acquiring new knowledge. In addition, it requires psychomotor skills such as body language, actively listening to the customer, and letting the customer finish talking. This discussion influences the design of *rubrics* insofar as, for each relevant communication situation, the targeted learning domains as well as, in particular, the necessary types of knowledge and cognitive processes, must be defined. But this is more than simply a list of specific keywords and processes; rather, the most necessary categories of knowledge and process need to be determined in their interaction.

Taxonomies of this kind represent however only a first cross-disciplinary approach to determining potential. That is why *clarifications in several directions* are needed.

First, a concrete *domain-specific*, subject-oriented view of the relevant communication situations, properly related knowledge content, and cognitive processes ("discipline generic skills", according to a talk by Richard Shavelson, on January 4, 2012; see also a memorandum by Benjamin Bloom, cited in Anderson et al., 2001, pp. XXVII-XXVIII) is required, which as a consequence calls for domain-specific *rubrics*. For example, what needs to be worked out are the characteristics of an insurance consultation in comparison with fashion advice, a sale in a specialty shop compared with a department store, or the jargon and etiquette among artisans when they are not talking to customers.

Second, some variations and limits must be observed, with respect to the so-called *comprehensive professional self-directed qualified action*.

- Even if "comprehensive" is understood to include "planning, execution and control of vocational activities" (Breuer, 2000, p. 154; to differentiate this process by analogy from a problem-solving process, see Straka, 2002, pp. 229–230), in our case, this may not only be reduced to practical oral activities. Rather, purely oral-theoretical actions can be accordingly arranged in that thoughts – especially in connection with reasoning or problem solving – can be developed following this progression and expressed verbally in a technical discussion.
- Action can vary along a continuum from pure reproduction to intensive transfer. At one end, many requirements for the professional are recurring and can be addressed by means of routines but, at the other end of the continuum, it is necessary to be able to deal with novel situations (Reetz & Hewlett, 2007, p. 23). Therefore also for oral communication situations it can be postulated as cognitive-oriented: "The more challenging … the cognitive requirements for the learner, the more elaborate the corresponding cognitive potential must be, i.e. the more nuanced knowledge and intensive thought processes are necessary" (Metzger, 2011, p. 385; transl.). Thereby both reproductive and transfer-oriented elements can occur in each communication situation.

- Also the degree of required or permitted independence can vary, for example, depending on how complex and imperative operational requirements are, how accurately a customer expresses an order or request, how well an expert is able to explain a problem, or even to what degree a task must be accomplished cooperatively.
- Further – at least on the basis of everyday experience – it is doubtful that professional conduct in these relevant communication situations can always and fully be consistently planned and carried out, or that planning takes place at all. In fact, immediate action is quite often required, e.g. in a consulting or sales situation. Although internalized action plans might be helpful, in a dialogue, often what is required is spontaneous response to the partner and thus flexible action. Furthermore, Straka (2000, p. 82), based on a case study, points to the fact that even highly skilled workers tend to jump back and forth between different stages and phases.
- As stated above, practical action may also become the subject of verbal reflection, be it before, during, or after the action. Reflection underpins the actions metacognitively and makes them more understandable and easier to follow for third parties. This reflection can take in the whole activity or just sections of it (single phases of action, the process or result of a practical or cognitive activity) so that they cannot be equated with comprehensive action.

For the design of *rubrics*, it then follows that the distinct types and facets of the comprehensive self-directed qualified action (e.g., practical versus cognitive activity, reproduction versus transfer, phases of action, predictability) must be specified. Especially important to note is that certain performances and underlying competencies can be separated according to phases and therefore should also be observed and assessed in a phase-specific way (e.g., stages of a consultation discussion, ex ante, during or ex-post reflection of a practical action). From these, performances are distinguishable as processes that are relevant to the whole activity, particularly pertaining to linguistic and non-verbal communication.

Third, it is critical to address an *additional dimensioning of competencies*. In connection with a comprehensive, professional, self-directed qualified action, there is a further broadly used distinction among technical or subject, methodological, social and personal or individual competencies (Reetz & Hewlett, 2007, pp. 25–26). Choosing these dimensions across the cognitive, affective, and psychomotor domains seems, to the author at least, a lean prospect for oral communication situations. In each of these situations, the primacy of technical knowledge and thought must already be assumed (Weinert, 2002, pp. 354–357). In other words, technical ability implies but weighs differently, aspects, such as dealings with other people and the use of domain-specific methods or procedures, including language as a means of communication as well as one's own metacognition, that – as shown – can be located entirely in the cognitive taxonomy. In the best case, an interaction of the mentioned competencies can be assumed, though it is difficult in individual cases

specifically to distinguish them (Friese, 2002, p. 75). The ability to communicate in a way appropriate to a given situation thus becomes actually a technical or subject-oriented competency that is, for example, easy to track during a sales conversation or technical discussion. Colloquially, it may be formulated: "He who knows little can, according to the situation, say little", but also "He who does not know what to say can only poorly show what he knows".

For the design of *rubrics*, it is therefore unpropitious to differentiate precisely or to distinguish at all between technical, methodical, social, or individual competencies, at least if we agree with the argument that, in every communication situation, the primacy of technical knowledge and thought as well as the integration of subject and person must be assumed. Then it is, from the point of view of measurement, necessary that criteria which should be observed and assessed as partial constructs are distinguishable from each other (Buttner, 2008, p. 285), meaning they do not overlap and are therefore not recorded multiple times. Consistent with this requirement is, for example, the rubric of Breuer and Höhn (1999, p. 48) for the observation and evaluation of an insurance sales agent's customer consultation, in that there is a process-oriented distinction among the three main criteria; management of the consultation (e.g., "creates a comfortable atmosphere", "uses positive body language"), customer and sales orientation (e.g., "can see the customer's perspective, understands customer needs/interests", "suggests appropriate alternatives/solutions") and integration of technical content ("which issues or products were discussed?"). However, aspects like "grasps the customer's arguments" or "asks questions appropriate to the situation", which appear in the section "management of the consultation", might be more appropriately assigned to the section "customer and sales orientation" (with the aspect "can see the customer's perspective, understands customer needs/interests"). Additionally, the entire section "integration of technical content" could be integrated into "customer and sales orientation". Rubrics that are similarly well regarded can be found for different oral communication situations in Reetz and Hewlett (2007, pp. 178–191) and Bauer-Klebl and Nüesch (2009). In comparison, it is problematic when, for example, "negotiation techniques" in a customer consultation are considered under methodological competency, "refutes objections" – although indeed an element of a negotiation technique – is assigned to technical competency (igkg.ch, n.d.), "negotiating capacity (responds to at least two customer objections and addresses them in a way appropriate to the situation)" is considered as "social competency", or "conversation structure (the phases 'needs assessment' and 'suggestion with value proposition' are seen)" is associated with methods competence (Swiss Bankers Association, 2011).

Fourthly, it was not articulated in the previous comments that *affective competencies* in the sense of motivation (emotion, attention, interest, attitudes), will and value (see Popham, 2009, pp. 79–81) are essential, indeed constitutive, to performance in oral communication situations. On the one hand, they support the communication process; on the other, such affective qualities in relation to things, persons, and situations can be revealed, sometimes more and sometimes less clearly, even on an

unconscious level – for example the desire to respond to customer needs, the sales assistant's identification with a product to be sold, their own work process or the results of their work. In comparison to cognitive and psychomotor aspects, these qualities remain less directly deducible, maybe because they are not the focus of the observation, maybe that the professionals consciously manifest only socially desirable behavior, or maybe even that the professionals' self-concepts do not correspond with their affectively influenced actions. In addition, it is difficult to define affectively oriented competency expectations as a SHOULD, because they are normative but often rather controversial – at least when it comes to value judgements – unless it deals with truisms broadly accepted in society, such as being ready to serve a guest in a friendly manner. Indirectly however, affective qualities will continue to be evaluated because they often affect the cognitive perfomance. Affective elements should only be included in a *rubric* if they are observable, normatively transparent, and generally accepted by experts. Thus experts would, for example, be able to observe and assess friendliness in a particular context. However, it is very difficult when, in the evaluation of a customer consultation, four out of 100 points are designated for deciding how well the candidate "gave the overall impression with his personality of being enthusiastic vs. satisfied vs. only partially satisfied vs. not satisfied vs. not satisfied and left a negative impression" or showing "healthy self-esteem" is assessed (e.g., igkg.ch, n.d.; transl.).

Fifth, with regard to communication situations, not only the necessary potential has to be determined, but also *appropriate quality requirements* and possible scores need to be defined, reflecting the possible levels of performance. From these previously established variations with regard to potential, it follows, however, that competency requirements or expectations may also vary and must be determined and graded for each situation and each relevant criterion within accordingly. At least implicitly, they are guided by an absolute benchmark, to which the pertinent requirements of a young professional are related. However, these requirements are not, so to speak, based "in the nature of the thing", but must continuously be constructed on the basis of experience. To lay down social norms as a basis for competition, instead of an absolute, is only justified if it is relevant to determine whether and to what extent one person can handle situations better than another (Metzger, 2011, pp. 391–392).

Looking at *rubrics*, that means, first, that levels of competence according to a verbalized grading scale (see Reetz & Hewlett, 2007, p. 240) are a first approximation. But they require a further operationalization of indicators for each criterion, e.g. with positive-negative lists (Reetz & Hewlett, 2007, pp. 189–191). For a customer service consultation, the criterion "listens well" could mean, among others: "listens actively, lets partner speak" versus "ignores questions, leafing through the documents" etc. (Reetz & Hewlett, 2007, p. 190; transl.); or, for a consultation discussion at a hairdressers, the criterion "customer advising" could be considered, among others, to mean: "identifies various treatment options, taking into account the customer's requests, evaluation of the hair and scalp, and the shape of the customer's face"

versus "suggests inappropriate treatment options, does not offer possible treatment alternatives" (Bauer-Klebl & Nüesch, 2007; transl.). Secondly, the sophistication of the grading within each criterion must be practice-oriented on the one hand, but on the other hand, keep an eye on the pressure on the examiners. The latter should be able to observe postulated quality differences during and immediately after an oral examination as such.

In summary, the attempt to determine every necessary potential according to varying communication situations leads to the insight that clarification and differentiation of the potential in different directions is required and, as a consequence, competencies that are necessary and able to be detected in the course of an examination respond only to limited or gradual standardization, across all oral communication situations as well as for each individual situation.

STANDARDIZATION IN LIGHT OF DESIGNING ORAL EXAMINATIONS

After judging from the situational as well as potential perspective that opportunities to standardize oral examinations are limited, it remains to consider whether standardization is possible at least at the *level of designing* an oral examination specifically within the micro level framework of a given selected examination form. Therefore also a leading principle must be to reach a good degree of both content and construct validity, which finally is vital to ensure that examinations are comparable for different examinees. Precisely this effort is then also central to what is often called in test theory and practice "performance" or "authentic assessment" (see Black & Wiliam, 2007, p. 27). Authenticity in terms of "high fidelity to the performance in the real world" – as Shavelson calls it (in his talk on January 4, 2012) – should be emphasized.

First is the *concrete setting of tasks*. For observed performances to be generalized to the examinee's true competence or most likely performance in the real world and appropriately extrapolated to most likely performance in comparable future professional roles, multiple similar tasks are necessary – in our case, several similar oral communication situations. Important situational criteria for selection are how often young professionals encounter such situations and how relevant and significant the situations are for them. Situations should be selected and configured so that they create the opportunity for examinees to demonstrate desired as well as required competencies in necessary breadth and depth and, indeed, in such a way that it can also be assumed that the young professionals can transfer the competencies to unfamiliar situations in the future. These requirements can indeed be considered as standards for authentic examinations. But they must be weighed for each single orally assessed communication situation, and need to be both concretized and adapted with regard to the tasks and the direction in which the examination situation goes. Therefore, it cannot simply be assumed that each individual task can be fully standardized, and especially not with regard to two aspects:

- Firstly, assignments and specifications must be so rich and open that the examinee experiences both a realistic free space and richness of the problem, as described in Breuer's example of the preparation for a customer consultation for insurance sales agents (Breuer, 2002, p. 159). However – as discussed earlier – it may be more realistic, for a different communication situation, to abandon preparation and role guidelines, such as for a sales discussion in a fashion store or a reflective technical discussion.
- Further, the behavior of the examiners – being a part of the task as well – can be only somewhat standardized. Indeed, similar valid initial conditions for examinees can be planned for by the preparation of appropriately challenging questions for a technical discussion (Metzger & Nüesch, 2004, pp. 106–107), role guidelines for a customer consultation (as proposed by Breuer, 2002, p. 160), or operationalization of the rubric's criteria in general. However, since any oral communication is, by definition, interactive, a dynamic develops during a conversation, which affects the conversation's process and content for the examinee as well as the examiners and therefore makes the conversation only partly predictable but also authentic – perhaps more so than a mere oral presentation.

Second, although it is common in the examination praxis to define and thus standardize the examination context and thus the concrete tasks by setting *a number of conditions* such as time, place and duration of the exam as well as the number of tasks for a particular communication situation, it is necessary, from the view of authenticity, to allow a certain flexibility. So, for the duration, it may be useful to specify only a range, since, depending on the course of a conversation, the goal (e.g., a sale completed or problem solved) may be achieved at different rates. Or it may be useful in some cases to conduct the examination directly in the workplace (e.g., for cooks because the authentic physical context is crucial) while, in other cases, an authentic perfomance can be simulated in the "laboratory" because only written information – if any – is necessary, which is true for many technical discussions.

Authenticity is a concern, **thirdly**, in the process of *observing and judging* the performance of the examiners. Assuming that in any form of oral examination at least two examiners are involved, the role allocation can be standardized by requirements or recommendations, for example, that one examiner takes the customer role or leads the technical discussion while the second examiner acts as an expert to observe and evaluate from a distance and keep a record of the examination. In contrast, observation and evaluation can only be standardized to a limited degree, even if it is assumed that rubrics are used and they are designed according the aforementioned requirements.

- In each of the outlined communication situations and examinations, the examinee's performance in relation to the relevant defined criteria and competence levels must be observed and assessed at the same time or one immediately after the other. Hence the risk of selective perception is more pronounced and the cognitive load

for the examiners (Hill, Charalambous & Kraft, 2011, p. 57) more challenging, than, for example, in written examinations.

- Further, the rational analytical approach of rubrics does not guarantee that experts will act in the same – and thus standardized analytical – way every time. At least from personal experience as an expert in countless oral examinations as well as from numerous expert training programs, two patterns can be discerned. Some examiners – and particularly the more experienced experts – often holistically assess an examination at the end. They begin by formulating their overall impression and assessment, then verify these analytically along each of the criteria and adapt their first judgement, if it seems necessary, or align the analytical judgement to the previously preferred holistic judgment. Other examiners – not least novices – proceed in a strictly analytical way. Moreover, the degree to which examiners identify with the rubrics can affect the outcome.

That the observation and assessment process can only be standardized to a limited degree is also a sign of authenticity, this time in relation to the examiners' behavior.

AN ONGOING ARGUMENT

Precisely in order to be adequately valid, the potential to standardize final oral examinations in the field of basic vocational education and training (VET) is limited on both the macro and micro levels. Adequate validity requires variation in test formats because, as the communication situations of young workers (graduates of basic vocational education) vary, so also would the expression of necessary potential or competencies vary – at least when the latter is to be depicted as authentically as possible. Accordingly, driven by the quest for authenticity, significant variation also develops in regard to the design of tasks, the interaction between examinee and examiners, as well as among examiners, and the appropriate design and use of instruments such as rubrics. The awareness of the potential and limits of standardization even increases the fairness for each single candidate while it does not interfere with adequate reliability – which has not been deepened explicitly in this contribution – as far as it can be reached for authentic oral examinations. This, at least, is a conclusion the author would like to discuss with Klaus Breuer.

REFERENCES

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J., & Wittrock, M. C. (Eds.) (2001). *A taxonomy for learning, teaching, and assessing. A revision of Bloom's Taxonomy of Educational Objectives.* New York: Longman.

Bauer-Klebl, A., & Nüesch, C. (2009). Das Fachgespräch in der beruflichen Bildung. *NetzWerk, 103*(3), 27–34.

Berufsbildungsverband der Versicherungswirtschaft (VBV). (n.d.a). *Lehrabschlussprüfung*. Retrieved April 12, 2012, from http://www.vbv.ch/de/nachwuchsentwicklung/kaufmaennische-grundbildung/lehrabschlusspruefung.

Berufsbildungsverband der Versicherungswirtschaft (VBV). (n.d.b). *Modelllehrgang Privatversicherung*. Retrieved April 12, 2012, from http://www.vbv.ch/de/nachwuchsentwicklung/kaufmaennische-rundbildung/lehrabschlusspruefung.

Black, P., & Wiliam, D. (2007). Large-scale assessment systems: Design principles drawn from international comparisons. *Measurement: Interdisciplinary Research and Perspective, 5*(1), 1–53.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (Eds.) (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain.* New York: David McKay.

Borch, H., Breuer, K., Müller, K., & Tauschek, R. (2006). *Umsetzungshilfen für die Abschlussprüfung der neuen industriellen und handwerklichen Elektroberufe.* Berlin: BMBF.

Breuer, K. (2002). Evaluation of authentic assessments in vocational examinations: Approaches within the German dual system. In: K. Breuer, & K. Beck (Eds.) *Are European Vocational Systems up to the Job?* Frankfurt: Peter Lang, 153–166.

Breuer, K. (2000). Mündliche Prüfungen als Kundenberatungsgespräche. In I. Stiller, & T. Tramm (Eds.) *Die kaufmännische Berufsbildung in der Diskussion*. Bielefeld: Bertelsmann, 95–105.

Breuer, K., & Höhn, K. (1999). *Wirtschaftsmodellversuch. Entwicklung und Implementation eines Qualitätsförderungssystems für berufliche Abschlussprüfungen für die handlungsorientierte Abschlussprüfung zum Versicherungskaufmann/zur Versicherungskauffrau auf Grundlage der Ausbildungsverordnung vom 8.2.1996. Abschlussbericht*. Karlsruhe: Versicherungswirtschaft.

Bundesamt für Berufsbildung und Technologie (BBT) (n. d.). Verordnungen über die berufliche Grundbildung. Retrieved April 12, 2012, from http://www.bbt.admin.ch/themen/grundbildung/00107/index.html?lang=de.

Bundesinstitut für Berufsbildung (BiBB) (2006). *Empfehlung für die Regelung von Prüfungsanforderungen in Ausbildungsordnungen*. Retrieved from http://www.bibb.de/de/28732. htm.

Büttner, G. (2008). Fragebögen und Ratingskalen. In W. Schneider, & M. Hasselhorn (Eds.) *Handbuch der Psychologie: Bd. 10. Handbuch der Pädagogischen Psychologie.*Göttingen: Hogrefe, 282–290.

Dörner, D. (1976). *Problemlösen als Informationsverarbeitung*. Stuttgart: Kohlhammer.

Friese, M. (2002). Identifizierung, Förderung und Bewertung von Sozial- und Methodenkompetenzen in personenorientierten Dienstleistungsberufen. In G. Pätzold, & S. Walzik (Eds.) *Methoden- und Sozialkompetenzen – ein Schlüssel zur Wissensgesellschaft?* Bielefeld: Bertelsmann, 69–80.

Halfpap, K. (1994). Beurteilung in Schule und Betrieb. In. P. Dünnhoff, J. Franke, K. Halfpap, H. Heid, W. Jeserich, H. C. Jongebloed, et al., & K. Wilbers (Eds.) *„abgehakt" – Über neue Ansprüche an die Gestaltung kaufmännischer Abschlussprüfungen*. Köln: Botermann & Botermann, 131–158.

Harden, R.M., & Gleeson, F. A. (1979). Assessment of clinical competence using an objective structured clinical examination (OSCE), *Medical Education, 13*, 41–54.

Hill, H. C., Charalambous, C. Y., & Kraft, M. A. (2011). When rater reliability is not enough: teacher observation systems and case for the generalizability study, *Educational Researcher, 41*(2), 56–64.

Ingenkamp, K., & Lissmann, U. (2008). *Lehrbuch der pädagogischen Diagnostik* (6. Aufl.). Weinheim: Beltz.

Institut für Wirtschaftspädagogik, Landesstiftung Baden-Württemberg & Baden-Württembergischer Handwerkstag e.V. (n. d.). *Fachgespräche didaktisch gestalten* [DVD]. St. Gallen: Author.

Interessengemeinschaft Kaufmännische Grundbildung (igkg.ch). (n. d.). *Mündliche Prüfung*. Retrieved April 12, 2012, from http://www.igkg.ch/index.php?mid=31&lan=de.

Kehm, B. M. (2001). Oral Examinations at German universities. *Assessment in Education, 1*, 25–31.

Kirk, S. (2004). *Beurteilung mündlicher Leistungen*. Bad Heilbrunn: Klinkhardt.

Memon, M. A., Joughin, G. R., & Memon, B. (2010). Oral assessment and postgraduate medical examinations: establishing condition for validity, reliability and fairness. *Advances in Health Sciences Education, 15,* 277–289.

Metzger, C. (2011). Kompetenzorientiert prüfen – Herausforderungen für Lehrpersonen. In O. Zlatkin-Troitschanskaia (Eds.) *Stationen Empirischer Bildungsforschung – Traditionslinien und Perspektiven*. Wiesbaden: VS Verlag, 383–394.

Metzger, C., & Nüesch, C. (2004). *Fair prüfen. Ein Qualitätsleitfaden für Prüfende an Hochschulen.* Hochschuldidaktische Schriften, Bd. 6. St. Gallen: Institut für Wirtschaftspädagogik.

Norgini, J. J. (2005) Current perspectives in assessment: the assessment of performance at work. *Medical Education, 39*, 880–889.

Popham, W. J. (2009). *Unlearned lessons: six stumbling blocks to our schools' success.* Cambridge: Harvard Education.

Reetz, L., & Hewlett, C. (2007). *Das Prüferhandbuch. Eine Handreichung zur Prüfungspraxis in der beruflichen Bildung*. Hamburg: b+r.

Schmidt, J. U. (2000). Erfassen neue Prüfungsformen wirklich berufliche Handlungskompetenz? *Berufsbildung in Wissenschaft und Praxis, 29*(2), 11–16. Retrieved from http://www.bibb.de/veroeffentlichungen/de/bwp/show/id/1656.

Schrauth, M., Schmulius, N., Zipfel, S., & Haarmeier, T. (2006). Praktische Prüfungen in der Neurologie – Das Tübinger Modell. *Der Nervenarzt, 77*, 1464–1468.

Schweizerische Bankiervereinigung (SwissBanking). (2011, January). *Kaufmännische Grundbildung, Bewertungskriterien Methoden- und Sozialkompetenz / Zusammenfassung der Bewertung*. Retrieved from http://www.swissbanking.org/lap_bewertungskrit_de-20110114.

Sloane, P. F. E. (2008). Vermessene Bildung - Überlegungen zur Entwicklung des Deutschen Qualifikationsrahmens [Editorial]. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 104,* 155–172.

Straka, G. A. (2000). Neue Formen zur Erfassung von Handlungskompetenz am Beispiel des Berufsfelds Bank – alte Hüte mit neuen Federn? In I. Stiller, & T. Tramm (Eds.) *Die kaufmännische Berufsbildung in der Diskussion*. Bielefeld: Bertelsmann, 79–94.

Straka, G. A. (2002). Leistungen im Bereich der beruflichen Bildung. In F. E. Weinert (Ed.) *Leistungsmessungen in Schulen* (2. Aufl.). Weinheim: Beltz, 219–235.

Weinert, F. E. (2002). Perspektiven der Schulleistungsmessung – mehrperspektivisch betrachtet. In F. E. Weinert (Ed.) *Leistungsmessungen in Schulen* (2. Aufl.). Weinheim: Beltz, 353–365.

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CHAPTER V

STRUCTURAL DEVELOPMENTS

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EVALUATION – REFORM – ADVANCEMENT?

The Example of the Swiss New Business Education

INTRODUCTION

Discussions about value, place, conditions and effects of autonomy in education and work belong to a century-old tradition. Depending on culture and history, autonomy has been conceived in various ways and its meaning and importance have been appreciated differently (Nenniger, 2011). In the era of globalization advanced economies are defined by highly developed technologies as well as by broad access to knowledge and innovations that are complex in their structure and demand approaches to enable independent mastery of such complexity (Beck & Heid, 1996; Sembill, 1996; Stark, Gruber, Graf, Renkl & Mandl, 1996; Friedrich & Mandl, 1997; Breuer & Brahm, 2004; Breuer & Wosnitza, 2004; Jäger, Nenniger, Petillon, Schwarz & Wolf, 2010). In order to have the capacity to survive in this challenging field, actually and in the future, commercial professionals need additional technical, method-related and social skills (cf. Hodkinson, 1992; Arnold & Schüssler, 2001).

With awareness of these future challenges, as early as the 1980s the first discussions about the reform of basic business education emerged in Switzerland (e.g. Dubs, 1983; 1989).

On the institutional level the former Federal Office for Commerce and Industry (Bundesamt für Industrie, Gewerbe und Arbeit [BIGA]) – predecessor of the current Federal Office for Professional Education and Technology [OPET] – issued a new ordonance about principles of education and examination in the vocational sector in 1986 and included in 1991 minimum standards for the different branches in commerce and industry. In elaborating the first list of branches in 1992 the participants became aware of the necessity of an ongoing exchange of ideas between all institutions and persons concerned (cf. Schweizerische Konferenz der Rektoren kaufmännischer Berufsschulen, 1994; cf. for overviews: Wettstein, 1995; Nenniger & Bissbort, 2008; Nenniger, 2012).

Regarding business education and training in 1994, a preliminary investigation was commissioned with the purpose of identifying and analyzing problematic areas in this sector. In this context the Federal Office for Commerce and Industry constituted a task-force for a project of reform which came to the following result: The dual system of business education and training (simultaneously combining apprenticeship at the company and vocational education at school) should be maintained, a federal ordonance concerning all branches should be developed and, in

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consequence, on the basis of a number of innovations, a reformed business education embedded in a professional system of vocational education should be elaborated (cf. o.A. Panorama 1994; 1995; Cavadini & Arnold, 1997; Müller-Grieshaber, 1998).

For this purpose, in the 1990s an association for the promotion of basic business education (Interessengemeinschaft zur Unterstützung der kaufmännischen Grundbildung [IGKG]) as well as the Swiss Conference for the Branches' Training and Examination (Schweizerische Konferenz der kaufmännischen Ausbildungs- und Prüfungsbranchen [SKKAB]) were founded. In 1999 provisional standing orders for training and examination in the business sector were released and from 2000 to 2003 the first pilot studies associated with scientific evaluations were initiated (for details, see Balzer, Frey & Nenniger, 1999; Frey, Balzer & Renold, 2001; Nenniger & Summermater, 2001; Bissbort & Nenniger, 2008).

CONCEPT AND OBJECTIVES OF THE NEW BUSINESS TRAINING

The main target of the reform constituted a reassessment of vocational training at the company combined with the realization of two central educational objectives: First, the guidance of the trainees towards independent, self-directed work enabling them to take responsibility in their workplace in a self-contained and self-reliant manner (cf. also Beck, Müller, Deissinger & Zimmermann, 1996; Nenniger, 1997; Straka, Nenniger, Plassmeier, Spevacek & Wosnitza, 2001), and second, the preparation for life-long learning, qualifying the trainees to successfully adopt the innovations in their profession and to acquire the flexibility to cope effectively with a labor market in permanent change. On the track intended to achieve these goals, the trainees should profit from their awareness of problems and opportunities experienced at the company in which they have been placed for their business training and should increasingly comprehend the complexity of work processes and develop their thinking in terms of networks. Regarding contents and curricular aspects, the "competence cube" was introduced as a new point of reference (Frey, Balzer & Renold, 2002).

The Competence Cube

As a consequence of this new view, emerging themes like computer-assisted communication, global networking, and increased complexity of operation sequences and procedures, had to be considered, and complementary or new knowledge backgrounds had to be introduced. Above all, it became clear that even updated knowledge-based professional competence was an insufficient prerequisite for the attainment of the targets mentioned above. Method competence and social competence are increasingly required as an indispensable supplement that qualifies future business people to act and to cope successfully with the complexity of their professional field. In particular, trainees should not only be instructed in these matters, but also be trained in how to acquire the respective knowledge and skills and in how to apply strategies of learning and work meaningfully, and finally encouraged and motivated

to perform it independently (Detailed overview on the concept: Federal Office for Professional Education and Technology [Bundesamt], 2006a).

For these reasons the traditional job description was replaced by a job profile represented in the "cube of competence" with the three dimensions of technical, method-related and social competence (cf. Figure 1) which form the basis and the core of the new business training course to be taught during their three-year training and simultaneously serve as a common terminology for trainees, business training companies and vocational school teachers. In this cube, competence in technical skills (Fachkompetenzen) comprises technical knowledge and abilities of their professional field regarding foreign languages, economy and society, information, communication and administration, as well as insight into the peculiarities of their own branch and company. Competence in method-related skills (Methodenkompetenzen), allowing acquisition of knowledge and ability, specifically regards presentation or sales techniques as well as using them adapted to the specific situation. Competence in social skills (Sozialkompetenzen), allowing to handle responsibly with oneself and to interact with the environment, specifically regards e.g. etiquette, air, discretion, capacity to negotiate, capacity for teamwork, self-confidence, resilience, flexibility etc.

Figure 1. Cube of Competence (adapted from OPET, 2006a).

Considering all three dimensions with the same importance, the main objectives of the new basic business education and training should be achieved in a degressive model of vocational education: The business training starts with a basic course at the vocational school where social skills (e.g. etiquette and self-reliance, team work) as well as working techniques, handling new technologies etc. are thought to enable the new trainees to immediately be absorbed into the job market or to start actively practicing in the commercial field. After the basic course at the vocational school (which also relieves the companies of the need to provide basic commercial knowledge and skills to their trainees), the trainees work at a company to an increasing extent and simultaneously attend classes at the vocational school to a decreasing extent. In consequence, towards the end of the training, the trainees will be available to their business training company for longer periods and can work on more realistic, complex and demanding tasks that offer them a broader scope of independent and active shaping of their own professional development, promote the learner's ability to organize, manage, and control the learning processes by meta-cognitive,

cognitive, and motivational strategies, and thus bring cognitive, emotional, motivational, social and context components together with autonomy in learning and work.

The Most Important Innovations

For this purpose a number of innovations have been developed and applied. Regarding the processes of learning and instruction the most important are:

Model training course (MLG) The model training course is the standard model based on the three dimensions of the competence cube (technical skills, method skills and social skills completed by sectorial addenda formulated by the trade associations, see, e.g. Interessengemeinschaft Kaufmännische Grundbildung, 2006) and applied at the following three levels:

1st level: Outlining the meaningfulness of the skills that must be acquired (guiding principle),
2nd level: Demonstrating and explaining appropriate behavior in daily business practice (attitude objective), and
3rd level: Describing the concrete abilities trainees are expected to master by the end of the training.

Simultaneously the structure of the model training course serves as a basis for the construction of assessment tests with respect to the achievement of learning objectives and performance targets.

Working and learning situations (ALS) In the company each trainee is assigned a vocational counsellor who periodically monitors work and accompanies the trainee in achieving his task. At the basis of monitoring are working and learning situations (ALS) which concentrate in each case on one central working area of the trainee. In an introductory discussion the vocational counsellor formulates suitable performance targets and behavioral criteria for assessing every ALS on the basis of the model training course. Subsequently, the trainee works intensively on the ALS for a period of at least three months. At the end of this period, in a final performance review meeting, the vocational counsellor gives feedback to the trainee and informs the trainee about his assessments in the concluding exam.

Process units (PE) In order that the trainees do not get settled into isolated individual activities during the training at the company but transcend the sector in which they are working and progressively gain insight into the entire work processes, a more intensive, process-oriented approach is required in the form of network stages. On the basis of the process units, trainees are offered opportunities to demonstrate their ability to recognize, understand and learn from professional events occurring in their company.

In order to ensure that the process units correspond with practical reality, the general lists of tasks suitable for process units are provided by the respective sector. The

vocational counsellor of the business training company determines the most important work stages and discusses them with the trainee in the preparatory meeting. Thereafter the trainee works in a process related to the PE task for a given period. Furthermore the elaboration of the process unit is accompanied by a course journal that serves for notes about thinking stages, reviews and deliberations of positive and negative experiences, etc. as well as for suggestions about improving their own learning and work. In addition it is also suggested that trainees draw conclusions about their own future behavior on the basis of knowledge and skills acquired on this task. At the end of the course the supervisor, applying predetermined assessment criteria, assesses the degree to which the trainee is able to understand and to command the process unit. The results become part of the final exam.

Inter-company courses (ÜK) Two to four inter-company courses, normally one day in length, are held. These are mandatory for the trainees and are organized by the trade associations of their sector. They are also the place where sector-specific knowledge can be imparted. The first course starts with an introduction to business training where the innovative tools (model training course, working and learning situations and process units) relevant to the specific sector and to the respective business are presented and explained. The following three courses are dedicated to the presentation of completed process units. Thereby the trainees present their process unit (previously reviewed at the company) including their observations and opinions about the reform. Each presentation is evaluated by two experts and comprises part of the final mark for the process unit completed.

The basic commercial training may be completed at three levels associated with specific profiles: The basic B-profile enables trainees to master mainly executive commercial tasks, the extended E-profile includes a large element of independence, given the opportunity of redefining abilities, tasks and processes, the capability of perfectly mastering the standard language and having a good command of a second language and of English.

The final exam consists of a class lecture course and a vocational sector-specific part, both rated equivalently, and entitles the trainees to become holders of the Certificate of Qualification of the Swiss Federation as professionals of a "qualified commercial professional, advanced basic training level".

Furthermore an M-profile is offered which, in addition to the E-profile, fulfills the requirements of commercial professional maturity level, allowing further studies at university.

EVALUATION OF TEST RUNS AND IMPLEMENTATION OF THE NEW BUSINESS TRAINING

The concept of the New Business Education described above started in the period between 2000 and 2003 with the first scientifically supervised and evaluated test runs (Results: Balzer, Frey, Renold & Nenniger, 2002) which gave rise

to conceptual modifications and finally resulted in an ordonance about qualification and examination in business training (Ausbildungs- und Prüfungsreglements «Kauffrau/Kaufmann»). It became effective in 2003 (Bundesamt für Berufsbildung und Technologie, 2000). In autumn 2003 the implementation of the New Business Education (Neue Kaufmännische Grundbildung [NKG]) started in the whole country and was accompanied by a further evaluation (Renold, Nenniger, Frey & Balzer, 2004; 2005), which will be object of the following deliberations.

Indicators show that the samples considered for evaluation are representative in terms of gender, linguistic area of Switzerland and proportion of small business companies. As a matter of fact, the trainees evaluated were only enrolled in the E-profile, which is the most important and most prevalent.

With respect to the issues considered, the core of this evaluation was concentrated on effectiveness and efficiency of the most important innovations and consisted – roughly described – of the following types of instruments (for details see Frey, Balzer, Renold & Nenniger, 2002):

- Marks and performance ratings (informal tests)
- Tests of method and social competence
- Questionnaire about specific innovations.

Overview of Samples, Instruments and Design

The evaluation was based on the following samples (Table 1):

Table 1. Description of Samples

	Vocational counsellors at companies	*Vocational counsellors at schools*	*Trainees in E-Profile*
Number of Participants	366–569	68–219	643–1691
Gender	62 - 40% male 38 -60% female	53 - 69% male 47 - 37% female	34 - 32% male 66 - 68% female
Linguistic area	88 - 89% German 10 - 8% French 2 - 3% Italian	79 - 65% German 16 - 22% French 5 - 13% Italian	88 - 69% German 8 - 20% French 2 - 11% Italian
Proportion of small business companies	69–73%	-	69–75%

The measures of the evaluation took place at three instances (cf. Table 2). The design of the evaluation was concentrated on the following three instances (for details: Balzer, Frey & Renold, 2001):

- First instance at the start of the evaluation focusing on the initial conditions at school and company and the competence of the trainees in view of the requirement of the innovations and the respective objectives.
- Second instance at mid-term focusing the general and specific appreciation of the innovations.
- Third instance at the end of the evaluation period focusing the final achievement of the objectives specifically targeted for the different innovations.

Further to this quantitative methodology, at the term of the evaluation period, selected results were completed with an in-depth study by use of structured narrative interviews about the most important innovation, the process units.

Table 2. Design and Contents of Measures

Start of Evaluation	*Mid-Term of Evaluation*	*Term of Evaluation*
Personal Data	Innovations: Questionnaire Competence: Test Objectives: Questionnaire Training: Performance ratings and Marks	Innovations: Questionnaire Competence: Test
Model Training Course: Performance ratings and Marks	Model Training Course: Performance ratings and Marks	

Summary of the Most Important Results of the Evaluations

With regard to the most important innovations promoting independence, flexibility and ability for life-long learning by developing technical, method and social competence, the findings of the evaluations give evidence of the following points (Details: Bundesamt für Berufsbildung und Technologie, 2004; 2005; 2006b; 2007):

Results addressing the model training course point to an insufficient attunement of the organization and execution of the course in the way that allows a meaningful achievement of its inherent targets, to a deficient co-ordination of the implementation between the Cantons of the Swiss Federation, and to the fact that the preparation at the vocational school only partly meets the ideas and expectation of the different companies. These results are also supported by the qualitative in-depth study additionally revealing some discordance about concept and usefulness.

Results addressing the sectorial trade associations' inter-company courses accompanying and completing the training reveal a sufficient match with the basic needs of the companies. There are some suggestions regarding a more efficient co-ordination of

duties between the companies. The above results are also in line with the outcomes of the qualitative in-depth study, even additionally emphasizing further positive effects.

Results addressing the process units as a whole and in particular as an innovation aligned with operational processes at the companies, merging traditionally separated curricular elements of the vocational school, widely acknowledge the usefulness of this approach as a contribution to a better comprehension of the companies' operating schedules. Criticisms are mostly related to the considerable efforts associated, specific ambiguities within and lack of flexibility connected with the design, accomplishment and evaluation of the outcomes which give rise to temporal bottlenecks and excessive demands on trainees and vocational counsellors. Supplemental information from the qualitative in-depth study is mostly in line with the quantitative study and underlines the benefits of the process units, particularly with regard to the improved comprehension of work at the company as well as the acquisition and performance of techniques like time management, time scheduling, and the writing and presentation of reports. Nevertheless advancement in comprehension of work at the company is still judged insufficient in contrast to the development of method and social competence. During the process of elaboration, the choice of the topic simultaneously demands and promotes independence of learning and work.

However, quality of performance also depends on documents and material made available from the company's counsellor and leaves some ambiguity about the understanding, desirability and appreciation of independent work. Assessment criteria lack differentiation, flexibility and, above all, objectivity across the various companies (Amos, Amsler, Martin & Metzger, 2004; Interessengemeinschaft kaufmännische Grundbildung, 2006).

Furthermore, co-operation between companies and vocational schools is not enhanced by the elaboration of process units, and potential links between subject matter acquired at school and experience at the company mostly remain obscure. Finally, the necessity and the usefulness of keeping a learning diary (*Lernjournal*) during the elaboration period is not well understood, mostly neglected and attracts the most negative appraisals.

Results addressing the working and learning situations designed for assessments of trainees' potential and performance represent the most positive appreciations, in particular from the perspective of the teachers at the vocational schools. The rare criticisms refer to some effort- and time-consuming aspects of execution as well as of supervision. Much more clarification is required for criteria of assessment. Further desiderata mentioned are increasing practical relevance, reduction of the amount of documentation and greater flexibility of deadlines.

CONSEQUENCES AND OUTLOOK

The evaluation demonstrates that the New Business Education – despite some reservations and criticisms in detail – has been accepted overall with cautious appreciation. The first main objective, guiding the trainees towards independent, self-directed

work and enabling them to take responsibility in their workplace in a self-contained and self-reliant manner, has been achieved in many important facets. The second central objective, preparing the trainees for life-long learning and qualifying them to successfully adopt the innovations in their profession and to acquire the flexibility to cope effectively with a labor market in permanent change, has been achieved in its foundations (cf. also Seitz, 2005).

Regarding the first objective, inter-company courses as well as working and learning situations have closely met the expectations of the reform. Continuously optimizing contact and co-ordination with further regard to practice as well as reduction of documentation and more flexibility in the deadlines for the second, are desiderata to accomplish without greater effort. In contrast, the model training course at the start of the training course needs thorough revision, for its concept as well as for its organization and implementation. As the most immediate consequence, the mutual insufficient knowledge of conditions and requirements of both vocational schools and companies has to be substantially improved and subsequently also the immediate contacts between the persons responsible for the training. Although it is impossible to arrange a basic training course at the vocational schools tailored for every single company, if a realistic exoneration of the companies from initial basic training is expected, it has to start at the beginning of the apprenticeship in a concise and compact format which has to be fixed on the most flexible institutional (i.e. local) level. With the same priority, the size (not the quality) of requirements within the process units needs to be reduced in several aspects and tightened (an effort which had already been initiated before). Furthermore the complex shape of the trainees' conditions of learning and work requires significantly increased consideration and also the standards of assessment need further clarification and updated reliability (for proposals, see: Metzger, 2003; 2006; Scharnhorst, Balzer & Renold, 2007).

Regarding the second objective, a serious judgement seems to be premature, as it would need to be based on several years of experience. Despite the curricular standards, the modalities and the manner of execution is also decisive. It is essential for both the trainees and the counsellors, that they autonomously gain insight into the proprieties and processes of their work as well as their responsibilities and that the trainees regularly exploit their additional scope of individual development. Thereby, understanding the appropriate balance between independence and claiming support, appreciating the value of reflection and acquiring trans-sectoral thinking are the necessary ingredients of success. In addition, the attitudes developed in dealing with the training and the evolving practice in solving ongoing problems (e.g. regarding rigor, diligence, sustainability, open mindedness, recognition etc.) play an important role whether the innovations are only declared important or furnished with life and enthusiasm.

However, the reform of business education and training has to be regarded as an example within the developments of vocational and professional education in Switzerland. With the revision of the Federal Constitution in 1999, the responsibility for legislation of all vocational and professional education and training was transferred to the Federal State. Based on the Federal Vocational and Professional

Education and Training Act of 2002, all occupational fields (except tertiary level A) were incorporated in a uniform system (including legal base, qualification, recognition procedure, standard curriculum etc.) under national responsibility and gave rise to a number of modifications and revisions, co-ordinated by the OPET and based on scientific evidence from evaluations as well as on discussions in a number of advisory task-force groups. Characteristic and proper for the actual Swiss vocational education and training (i.e. considerably different from most European vocational and professional education and training systems) are

- dual-track (apprenticeship) and wide-ranging tertiary programs (except tertiary level A),
- with high permeability based on clearly defined curricula and national qualification procedures,
- a broad range of basic and continuing education and training, and
- close cooperation between the Federal State, Cantons and professional organizations (involved in defining the content and objectives).

The Swiss New Business Education and training program may serve as an example of a perhaps late but still successful re-assessment of vocational education and training which emphasizes that trust in flexibility, autonomy and self-direction of trainees in learning and at work pays off. This is presumably one of the key conditions for the lasting high employment rate of young people in this country.

REFERENCES

Amos, J., Amsler, F., Martin, M., & Metzger, C. (2004). *Evaluation von Abschlussprüfungen der beruflichen Grundausbildung*. Basel: Büro für Kommunikation.

Arnold, R., & Schüssler, I. (2001). Entwicklung des Kompetenzbegriffs und seine Bedeutung für die Berufsbildung und für die Berufsbildungsforschung. In G. Franke (Ed.) *Komplexität und Kompetenz*. Bielefeld: Bertelsmann, 52–74.

Balzer, L., Frey, A., & Renold, U. (2001). Reform kaufmännischer Grundausbildung in der Schweiz - Innovationen und Evaluationsdesign. *BWP - Berufsbildung in Wissenschaft und Praxis, 30*(1), 14–19.

Balzer, L., Frey, A., Renold, U., & Nenniger, P. (2002). *Reform der kaufmännischen Grundausbildung* (*Band 2: Ergebnisse der Evaluation*). Landau: Empirische Pädagogik.

Balzer, L., Frey, A., & Nenniger, P. (1999). Was ist und wie funktioniert Evaluation? In *Empirische Pädagogik, 13*(4), 393–413.

Beck, K., & Heid, H. (Eds.) (1996). Lehr- Lern- Prozesse in der kaufmännischen Erstausbildung – Wissenserwerb, Motivierungsgeschehen und Handlungskompetenzen. *Zeitschrift für Berufs- und Wirtschaftspädagogik. Beiheft 13*. Stuttgart: Steiner.

Beck, K., Müller, W., Deissinger, T., & Zimmermann, M. (Eds.) (1996). *Berufserziehung im Umbruch. Didaktische Herausforderungen und Ansätze zu ihrer Bewältigung*. Weinheim: Beltz.

Bissbort, D., & Nenniger, P. (2008). Zusammenfassender Überblick zur Geschichte, Evaluation und Bewertung der Reform der kaufmännischen Grundbildung. In Bundesamt für Berufsbildung und Technologie (Eds.). *Abschlussbericht zur Evaluation der kaufmännischen Grundbildung*. Bern: BBT, D7–D14.

Breuer, K., & Brahm, T. (2004). Die Abbildung von Befähigungen zur Selbstregulation. In M. Wosnitza, A. Frey, & R. S. Jäger (Eds.) *Lernprozess, Lernumgebung und Lerndiagnostik. Wissenschaftliche Beiträge zum Lernen im 21. Jahrhundert*. Landau: VEP, 363–374.

Breuer, K., & Wosnitza, M. (2004). Befähigung zur Selbstregulation in der Entwicklung während der Ausbildung. In M. Pilz (Ed.) *Sozialkompetenzen zwischen theoretischer Fundierung und pragmatischer Umsetzung* [Band zum Workshop 22 -Sozialkompetenz bei den Hochschultagen berufliche Bildung 2004], Bielefeld: Bertelsmann, 47–60.

Bundesamt für Berufsbildung und Technologie (2000). *Kauffrau/Kaufmann. Reglement über die Ausbildung und Lehrabschlussprüfung*. Retrieved 18.02.2006 from http://www.bbt.admin.ch/

Bundesamt für Berufsbildung und Technologie (2004). Standortbericht zur Einführungsphase der neuen kaufmännischen Grundbildung - Eine Kurzdarstellung der Resultate einer Studie zum Basiskurs und zum ersten überbetrieblichen Kurs innerhalb des Ausbildungsjahrgangs 2003 (*Evaluation der kaufmännischen Grundbildung: Heft 1*). Bern: BBT.

Bundesamt für Berufsbildung und Technologie (2005). Standortbericht zur Befragung nach dem 1. Lehrjahr - Eine Kurzdarstellung der Resultate der ersten Befragung zu Kompetenzen, Leistungszielen und Innovationen der Reform (*Evaluation der kaufmännischen Grundbildung: Heft 2*). Bern: BBT.

Bundesamt für Berufsbildung und Technologie (2006a). *Neue Kaufmännische Grundbildung*. Retrieved 18.02.2006 from http://www.rkg.ch/index.cfm?

Bundesamt für Berufsbildung und Technologie (2006b). Standortbericht zur Befragung nach dem 2. Lehrjahr - Eine Kurzdarstellung der Resultate der zweiten Befragung zu Prozesseinheiten, Ausbildungseinheiten und Arbeits- und Lernsituationen (*Evaluation der kaufmännischen Grundbildung: Heft 3*). Bern: BBT.

Bundesamt für Berufsbildung und Technologie (2007). Standortbericht zur Befragung am Ende des 3. Lehrjahrs - Eine Kurzdarstellung der Resultate der dritten Befragung zu den Kompetenzen der Lernenden und zur Bewertung der NKG (*Evaluation der kaufmännischen Grundbildung: Heft 4*). Bern: BBT.

Cavadini, P., & Arnold, R. (1997). *Problemanalyse, Ausbildungsziele, Grundkonzept*. Bern: BIGA.

Dubs, R. (Ed.) (1983). *10 Jahre IWP : Beiträge zu Fragen der wirtschaftlichen Bildung an Schulen und der Ausbildung von Handelslehrern*. Aarau: Sauerländer.

Dubs, R. (1989). *Kaufmännische Berufsbildung für die Zukunft. Bericht zur Informationstagung vom 25. Januar 1989 in Zürich*. St. Gallen: HSG, Institut für Wirtschaftspädagogik.

Frey, A., Balzer, L., & Renold, U. (2001). Die Reform der kaufmännischen Grundausbildung in der Schweiz - Ausgewählte Innovationen und erste Ergebnisse. *Wirtschaft und Erziehung, 53*(7/8), 248–256.

Frey, A., Balzer, L., & Renold, U. (2002). Kompetenzen in der Grundausbildung. *Panorama, 16*(2), 8–10.

Frey, A., Balzer, L., Renold, U., & Nenniger, P. (2002). *Reform der kaufmännischen Grundausbildung (Band 2: Instrumente der Evaluation)*. Landau: Empirische Pädagogik.

Friedrich, H. F., & Mandl, H. (1997). Analyse und Förderung selbstgesteuerten Lernens. In F. E. Weinert, & H. Mandl (Eds.) *Psychologie der Erwachsenenbildung*. Göttingen: Hogrefe, 237–294.

Hodkinson, P. (1992). Alternative Models of Competence in Vocational Education and Training. *Journal of Further and Higher Education, 16*, 2.

Interessengemeinschaft Kaufmännische Grundbildung. (2006). *Berufspraktische Situationen und Fälle für Lernende, die keiner spezialisierten Ausbildungs- und Prüfungsbranche angehören*. Retrieved 18.02.2006 from http://www.igkg.ch/deutsch/lap.

Jäger, R. S., Nenniger, P., Petillon, H., Schwarz, B., & Wolf, B. (Eds.) (2010*). Empirische Pädagogik 1990 – 2010. Eine Bestandsaufnahme der Forschung in der Bundesrepublik Deutschland: Bd. 1: Grundlegende empirische pädagogische Forschung*. Landau: Empirische Pädagogik.

Metzger, C. (2003). Mündliche Prüfungen werden vielgestaltiger. [Editorial]. *Schweizerische Zeitschrift für Kaufmännisches Bildungswesen, 97*, 2–5.

Metzger, C. (2006). *Kompetenzorientiert prüfen in der beruflichen Grundbildung der Schweiz: Anspruch und Wirklichkeit – gezeigt am Beispiel der kaufmännischen Grundbildung*. *bwp@* Berufs- und Wirtschaftspädagogik – online, Ausgabe 8.

Müller-Grieshaber, P. (1998). Stand der Reform der kaufmännischen Grundausbildung. *Panorama, 11*, 26–27.

Nenniger, P. (1997). Können und Wollen: Zur Bedeutung der Selbständigkeit im beruflichen Lernen. *WSB intern*, *2*/97, 52–61.

Nenniger, P. (2011). Autonomy in Learning and Instruction (Roots, Frames and Concepts of a Basic Issue). In P. R. Martin, F. M. Cheung, M. C. Kyrios, & M. Knowles (Eds.) *Handbook of Applied Psychology* (Blackwell IAAP Handbooks of Applied Psychology). Oxford: Wiley-Blackwell.

Nenniger, P. (2012). Das Schulwesen in Deutschland und in der Schweiz: Über Unterschiede von scheinbar Gleichem. In A. Hoffmann-Ocon, & A. Schmidtke (Eds.). Reformprozesse im Bildungswesen. Zwischen Bildungspolitik und Bildungswissenschaft. Wiesbaden: VS Verlag, 17–37.

Nenniger, P., & Bissbort, D. (2008). Die Geschichte der Reform der kaufmännischen Grundbildung. In Bundesamt für Berufsbildung und Technologie (Eds.) *Abschlussbericht zur Evaluation der kaufmännischen Grundbildung*. Bern: BBT, D15-D21.

Nenniger, P., & Summermatter, H. (Eds.) (2001). *Reform der kaufmännischen Grundausbildung (Band 1: Innovationen, Implementation und Evaluation)*. Landau: Empirische Pädagogik.

o.A. (1994). Reform der kaufmännischen Grundausbildung. *Panorama, 28*, 33–34.

o.A. (1995). Strategiepapier zur Reform der kaufmännischen Grundausbildung. *Panorama, 34*, 22–23.

OPET see: Bundesamt für Berufsbildung und Technologie.

Renold, U., Nenniger, P., Frey, A., & Balzer, L. (2004). *Reform der kaufmännischen Grundbildung (Band 4: Konsequenzen und Umsetzung der Reform)*. Landau: Empirische Pädagogik.

Renold, U., Nenniger, P., Frey, A., & Balzer, L. (2005). *Réforme de la formation commerciale de base (Volume 4a: Conséquences et mise en oeuvre de la réforme)*. Landau: Empirische Pädagogik.

Scharnhorst, U., Balzer, L., & Renold, U. (2007). Praxisorientierte Qualifikationsverfahren und Qualifikationsverfahren für den Betrieb im Rahmen der kaufmännischen Grundbildung in der Schweiz. In P. Grollmann, K. Luomi-Messerer, M.-L. Stenssström, & R. Tutschner (Eds.) *Praxisbegleitende Prüfungen und Beurteilungen in der Beruflichen Bildung in Europa*. Wien: LIT, 221–235.

Schweizerische Konferenz der Rektoren kaufmännischer Berufsschulen (1994). *10 Thesen zur Reform der kaufmännischen Berufsausbildung*. Bern.

Seitz, H. (2005). Reform der Kaufmännischen Grundbildung in der Schweiz – Erste provisorische Ergebnisse aus einem Forschungsprojekt. In *Berufs- und Wirtschaftspädagogik - online. H. Spezial 2*. Retrieved from http://www.bwpat.de/spezial2/seitz_spezial2-bwpat.pdf.

Sembill, D. (1996). Systemisches Denken, Selbstorganisiertes Lernen, Ganzheitliches Handeln - Systemtheoretische Reflexionen und erziehungswissenschaftliche Umsetzungen. In K. Beck, W. Müller, T. Deissinger, & M. Zimmermann (Eds.) *Berufserziehung im Umbruch. Didaktische Herausforderungen und Ansätze zu ihrer Bewältigung*. Weinheim: Beltz, 61–78.

Stark, R., Gruber, H., Graf, M., Renkl, A., & Mandl, H. (1996). Komplexes Lernen in der kaufmännischen Erstausbildung: Kognitive und motivationale Aspekte. In K. Beck, W. Müller, T. Deissinger, & M. Zimmermann (Eds.) *Berufserziehung im Umbruch. Didaktische Herausforderungen und Ansätze zu ihrer Bewältigung*. Weinheim: Beltz, 23–36.

Straka, G. A., Nenniger, P., Plaßmeier, N., Spevacek, G., & Wosnitza, M. (2001). Development, trial and evaluation of a further education concept of teaching staff and trainers to promote motivated self-directed learning in schools and companies in business education. In K. Beck, & V. Krumm (Eds.) *Lehren und Lernen in der beruflichen Erstausbildung. Grundlagen einer modernen kaufmännischen Berufsqualifizierung*. Opladen: Leske & Budrich, 77–92.

Wettstein, E. (1995*). Berufliche Bildung in der Schweiz*. Luzern : Deutschschweizerische Berufsbildungsämter-Konferenz.

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ASSESSING RESEARCH ON SCHOOL LEADERSHIP IN GERMANY FROM AN INTERNATIONAL PERSPECTIVE

INTRODUCTION

Over the past fifteen years, educational governance regimes within and across national borders have undergone substantial changes, regarding which four basic trends can be distinguished (Dubs, 2012): (1) Governing modes are no longer input-oriented but output-driven, (2) political ends have shifted from comprehensive provision of public schooling to the strategic improvement of school quality, (3) measures taken within each school should no longer be fragmented but coherent and embedded in the organizations' quality management framework, (4) as schools are granted more decision-making latitude over operative procedures, instructional programs, budgeting and staff management, the tasks and responsibilities of principals are growing. Although these changes are mainly due to the fundamental restructuring of the state-run school administration, they are also rooted in societal changes and reinforced by the results of cross-national comparative studies supporting the thesis of a positive relationship between school autonomy and educational outcomes (Hanushek & Woessmann, 2010).

Because principals are expected to play a crucial role in revised modes of educational governance, it is not surprising to witness a steady growth in the number of publications on school leadership. However, in Germany these are dominated by conceptual contributions and the reflections of practitioners (Bonsen, 2006). Empirical research on school leadership continues to be a marginal and fragmented segment within educational sciences (Pfeifer, 2002; Kranz, 2007; Wissinger, 2011), a factor indicated by the lack of thematically relevant peer-reviewed journals that are well established in the international scientific community (e.g. the *International Journal of Leadership in Education*).

In this article, we will present a synthesis of the main topics addressed in both national and international empirical studies on school leadership since the late 1980s. By contrasting national and international approaches, we wish to highlight systematic differences and identify important issues that should be tackled in future studies in Germany if these are to have the desired greater impact called for by critics (e.g. Dubs, 2012). With reference to an integrative theoretical model developed by Hallinger (2011), we will explain analytical categories and discuss methodological

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 269–280.

consequences for thorough investigations into the enactment of school leadership and its potential effects. In the course of this, we will also outline the design and results of a current study.

TOPICS ADDRESSED IN EMPIRICAL STUDIES IN GERMANY

In depth reviews of school leadership research in Germany have been scarce until recently (e.g. Kranz, 2007; Wissinger, 2011; Tenberg & Pfister, 2012), and according to these reviews, three prevailing subject domains are apparent:

- *functional analyses* and *activity studies*, which are mostly based on subjective estimations of the time needed or the efforts undertaken to accomplish different tasks;
- *principals' judgements* on a range of reform measures within the German school system (e.g. content and scale of school autonomy, forms of school inspection) as well as *principals' attitudes* towards their emerging responsibilities and functions (e.g. human resource management);
- *subjective belief systems* and *individual strategies* of mastering new professional requirements, with analytical categories ranging from occupational identity to subjective theories on leadership to professional and organizational knowledge.
- Many of these studies are quite casual in their gathering of empirical evidence on *work-related stress* and *job satisfaction* experienced by school principals, and only a few of them are grounded in theories developed in work, stress or health psychology (see Warwas, 2012).

Another field of inquiry is concerned with *women as school principals*, which retraces career choices or explores the ways in which female principals interact with teachers and other stakeholders. However, in this field systematic gender comparisons regarding observable leadership behavior are clearly outnumbered by biographical interviews with female executives.

Finally, empirical findings concerning the *qualification and training* of principals can be characterized as rudimentary. The same is true for studies investigating principals' influence on selected aspects of organizational quality. The few studies that can be assigned to this field typically deal with the question of how certain activities undertaken by the principal foster the collaboration of teachers or support the successful implementation of pedagogical innovations.

TOWARDS A CLASSIFICATION OF INTERNATIONAL RESEARCH ON SCHOOL LEADERSHIP

Due to the simple fact that international school leadership research is spread out geographically, the numbers of publications exceed by far those found within national boundaries. In order to gain a general but representative overview of the topics which dominate international approaches, we confined our search to empirical studies published in English-language, peer-reviewed journals.

Strategies Used for Retrieval and Analysis

The search for relevant articles was based on electronic database queries employing the terms *school leadership* and *principal*. At first, we eliminated monographs and chapters in handbooks to confine results to journal articles. Contributions written in languages other than English were also excluded. Subsequently, abstracts and article keywords were examined to sort out theoretical discussions as well as empirical meta-analyses. In the course of this selection process the number of relevant articles was reduced to 170, out of which 106 were placed in the following journals: *Journal of Education Administration*, *School Leadership and Management*, *International Journal of Leadership in Education*, *School Effectiveness and School Improvement*, *Leadership and Policy in Schools*. The studies were published during the period 1987–2012 and the majority of them were conducted in the USA and Great Britain.

After entering citation parameters into a spreadsheet, the abstracts and keywords used by the authors were again examined in order to extend the entries by distinct topics. We used up to three generic terms for each article in order to map frequent combinations of topics.

Results of the Classification Processes

Figure 1 displays the 302 terms that resulted from our search. By considering the size and color of the graphic elements (indicating the frequency and conceptual similarity of the mentioned terms) and the lines drawn between these elements (depicting typical conjunctions of terms) we can separate central and peripheral fields of international research on school leadership.

Leadership behavior. As shown in the black squares (Figure 1), many of the studies investigate the degree to which the principals' actions conform to normative concepts of school leadership. Although researchers rely on survey methods rather than participant observation techniques, several studies capture leadership styles as they are perceived by the teachers, and not as reported by the principals themselves. In recent years, there is a growing interest in cooperative modes of leadership (labelled, for example, as "distributed", "collaborative", or "democratic" leadership), but also in exotic concepts like "parallel", "strategic", "systemic", or "productive" leadership. However, the performance of "transformational" and "instructional" leadership activities (separately or comparatively) continues to be the main target (see Leithwood & Jantzi, 2005). A few studies try to detect contextual preconditions which determine the behavioral dimensions of principals. Many others examine if certain leadership styles are systematically associated with the establishment of professional learning communities of teachers, organizational learning processes and student outcomes (see Robinson, Lloyd & Rowe, 2008, for a meta-analysis of present findings), thereby extending into another extensive field of inquiry.

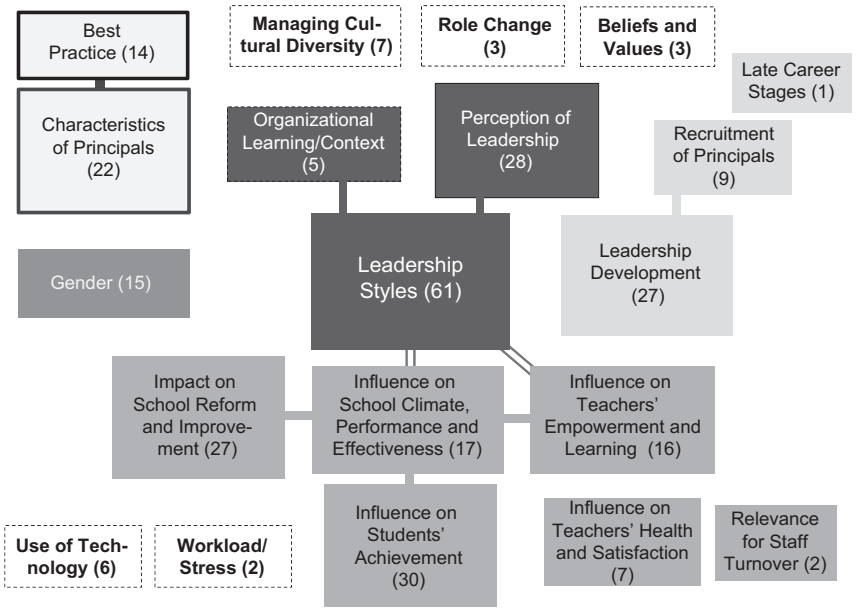

Figure 1. Central and peripheral fields in international research on school leadership (with absolute numbers referring to terms mentioned in abstracts and keywords of articles that were published in international journals from 1987 to 2012).

Leadership effectiveness. International approaches follow a long tradition of quantifying the principals' influence on a multitude of output-related parameters of their schools (dark gray squares in Figure 1). Great importance is attached to measures of student learning outcomes. Predominantly, scores in standardized tests of academic achievement are employed in statistical evaluations, allowing large sample sizes. But consistent with meta-analyses that reveal that leadership effects on the students' learning success are largely indirect, many studies scrutinize the principals' contributions to promote teacher empowerment, collaboration and learning, to enhance a positive organizational climate and/or to create productive work environments (e.g. by means of school vision, educational programs, working structures). These dimensions serve either as a singular criterion for leadership success or as its mediator. Investigations into the principals' influence on teachers' health, job satisfaction and even staff turnover constitute only a small segment within the realm of leadership effectiveness studies. Many more studies attend to the principals' impact on diverse projects of school reform and school improvement.

Characteristics of successful leaders in specific regional contexts. Quite a significant number of articles use case studies portraying the personal traits and practices of successful principals operating in specific countries or school types

(black-framed squares in Figure 1). Most of these studies do not aim at eliciting generally effective leadership activities, but instead illustrate local contingencies of the principals' decisions and actions in great detail.

Recruitment and development of principals. Several articles attend to problems of identifying and assessing potential candidates for executive positions (light gray squares in Figure 1). Others analyze motivational factors as well as impediments for the application of capable teachers. Moreover, evaluation studies of coaching programs or training courses can be attributed to this field of research.

All other research questions illustrated in Figure 1 are addressed only occasionally. Some of them are loosely related to the principals' *workplace situation* (Workload/ Stress and Use of Technology) or to *new responsibilities and tasks* (Role Change and Managing Cultural Diversity). Explorations into the personal *values and beliefs* of school leaders can be considered to be uncommon topics in international journals.

What Accounts for the Different Topographies of Leadership Research in Germany and Internationally?

In an overall assessment the focal points of empirical studies located in Germany can be characterized as almost diametrically opposed to those found internationally. On the one side, most German researchers meticulously reconstruct principals' subjective perceptions and interpretations of professional requirements and working conditions as well as their aims and preferred strategies of dealing with these requirements, while ignoring the possible consequences of these strategies on organizational quality and performance. On the other hand, studies published in international journals mainly categorize overt or self-reported leadership behavior and examine its impact on multiple facets of school climate, operational procedures and educational achievements, but they tend to neglect the principals' belief systems, values and intentions as essential motivational factors explaining different leadership practices. Moreover, whereas the topic of the experience of "Role change" can be found in many German studies, it rarely attracts the attention of researchers in other countries. Problems of leadership development and recruitment account for a substantial segment of international publications, but are rare in German publications.

These different research topographies are largely due to the theoretical foundations of the studies. International approaches often refer to prescriptive concepts of successful leadership (e.g. Bush & Glover, 2003) and theoretical models of school improvement and school effectiveness (e.g. Slater & Teddlie, 1992), which explains their focus on leadership styles and performance measures. The theoretical underpinnings of German studies can be termed as eclectic, causing not only extremely heterogeneous attempts to capture belief systems and strategies of action but also empirical findings which are almost impossible to compare. Here, models and concepts are borrowed from sociological, biographical and gender research, from stress, health and identity theories, from organizational theory and many more.

There are historical reasons why "coping with role change" is addressed in more German approaches to leadership in schools, as for many decades principals did not have the status of professionals and were not trained for their tasks until they were appointed to their office (see Rosenbusch & Warwas, 2010).

In view of the vast empirical knowledge on successful leadership practices gained during decades of international research, it is tempting to derive hypotheses for replication studies in Germany. However, this strategy would miss the fact that even subtle deviations in country-specific degrees of school autonomy can create substantial differences in terms of enabling or obstructing institutional structures for the application of certain leadership styles (Braukmann, 2012).

CONSIDERATIONS FOR FUTURE STUDIES IN GERMANY

Compared with international approaches, research on school leadership in Germany is characterized not only by a limited scope of research questions, but also by the absence of an integrative analytical framework. In order to investigate the enactment of leadership practices and their impact systematically, it seems necessary to (1) supplement extensive investigations into diverging belief systems and preferred action strategies of principals by analyses explaining their differential effects on work processes and results within the organization, (2) disclose contextual dependencies of actions as well as of leadership success or failure.

For these purposes, principals must be theoretically conceptualized as intermediate actors of educational governance located at the intersection of different levels of the school system and faced with the task of reconciling the conflicting rules, demands and traditions of the respective levels (e.g. Zlatkin-Troitschanskaia, 2006). Given this intermediate position, they have to enable teachers as actors within the operational level to understand steering impulses generated by policy makers, administrative authorities and school inspectors and to translate these impulses into guidelines and activities that match the logic of their own sector (Altrichter, Kemethofer & Leitgöb, 2012).

Integrative Analytical Framework

In this paper, we extend Hallingers' model of "Leadership for learning" (2011) to outline essential determinants on leadership behavior as well as distinct pathways of leadership effects. The proposed analytical framework might help to sort and evaluate the numerous topics and findings of previous studies in Germany which until now have existed in isolation from and unconnected to each other. The structure of this framework is based on the following assumptions:

- *Leadership practices are fundamentally shaped by societal and institutional preconditions:* Obviously, principals have to comply with the specific rules and regulations set by national and federal ministries and authorities. But principals

are also required to meet socially and scientifically recognized standards of professional conduct (e.g. prescriptive leadership styles). Disparities between configurations of school autonomy in the federal states as well as the availability or lack of support by supervisory education authorities provide more or less room for maneuver – notwithstanding the fact that the principals' subjective assessments of such preconditions partially deviate from those of legal experts (Brauckmann, 2012).

- *Leadership practices are nested in a specific organizational context and local environment:* During their daily work, principals adjust their decisions and actions carefully, though not always consciously, to the needs, opportunities and restrictions they discern within the school and its immediate surroundings. When interacting with teachers and parents, when implementing projects of school reform and improvement, they respond to multiple structural and social premises. These contextual parameters include characteristics of the staff (e.g. qualifications, expert knowledge, and demands of teachers), established work structures and routines (e.g. the existence or absence of steering committees; prevalence of the occupational norms of autonomy and parity), and characteristics of the community (e.g. socio-economic status of the students' families).
- *Leadership practices are moderated by individual characteristics of the principals:* The decisions and actions of principals are neither thoughtless executions of legal and normative guidelines nor simple reactions to organisational stimuli. They vary considerably according to the intentions, professional identities, situational appraisals and self-assessments, personality traits values, beliefs and expert knowledge of the principals themselves (e.g. Warwas, 2012).
- *Leadership effects on output-related variables are mediated through school-level processes:* Although principals should and usually do strive to enhance the learning results of students, they can only influence these parameters by means of capacity building among staff members and improved organizational quality. The principals' impact on educational achievement has to be conceived as largely indirect, channeled for instance by formulating inspiring visions and concrete goals for the school, improving work flows, revising pedagogical programs, establishing a productive and cooperative school climate and promoting the professional development of the teachers. In this way, leadership practices are incrementally or even radically changing at least some characteristics of the organisational context. These reciprocal effects are displayed by the double-headed arrows in Figure 2.

As with any other collection of hypothetical factors influencing the decisions and actions of principals and their potential effects on school life, the parameters included in this model are certainly not exhaustive. Regardless of this, the basic structure of the framework might serve as an integrative model for designing a comprehensive study examining various variables in their entirety.

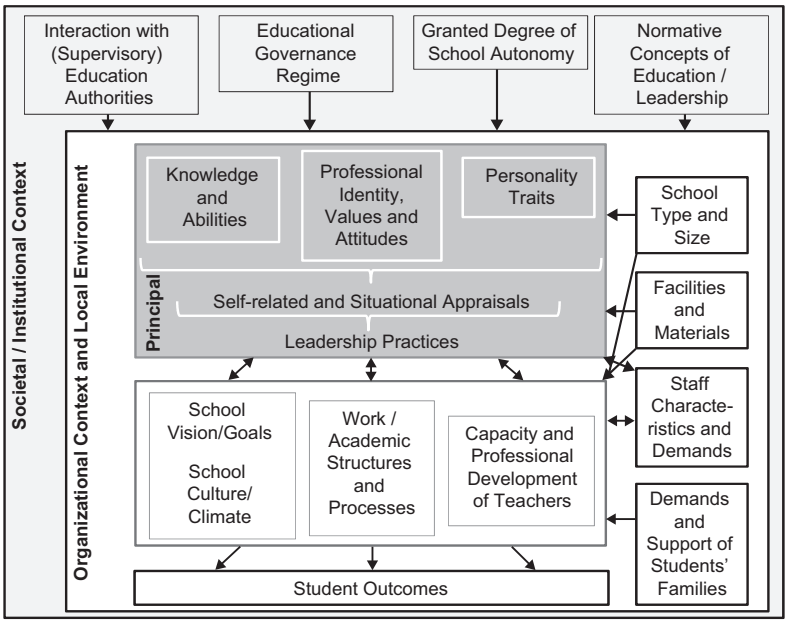

Figure 2. An extended version of Hallinger's model of "Leadership for Learning" (2011, p. 127).

METHODOLOGICAL IMPLICATIONS

Drawing on this analytical framework in empirical approaches calls for appropriate methods of data collection and analysis. With reference to current debates on educational governance research as well as school leadership research in Germany (see Zlatkin-Troitschanskaia, 2006; Maag Merki & Altrichter, 2010; Dubs, 2012) we would like to emphasize the following research strategies:

- *Multivariate and multi-level analyses:* Apart from a few exceptions, empirical evidence from German studies is predominantly based on descriptive and correlative findings with a focus on singular dimensions or conditions of the principals' beliefs, decisions and actions. Given the complex structure of the analytical framework, greater attention should be given to *patterns* of influencing variables, to distinguish *configurations* of leadership activities and their social embedding, and to show the *mediated effects* of leadership practice on output-related variables. For these purposes, typological approaches, structural equation models and hierarchical linear models are indispensable.
- *Longitudinal studies:* Processes of organizational change and learning, effects of changed leadership practices, of initiated reforms, heightened empowerment and the like mostly evolve during long periods of time. In order to trace processes

of adaption, negotiation, interaction and change, longitudinal studies are required.

- *Comparative studies between diverse organizational and institutional settings:* Whenever research aims to detect contextual contingencies of leadership behavior or reasons for its differential effects on school life, it is crucial to isolate causal variables while controlling third variables. To this end, sample composition should allow systematic comparisons of different contextual parameters, for instance, comparisons between different school types or federal states with varying degrees of school autonomy.
- *Mixed-method approaches:* Leadership studies in Germany are on the whole based on written questionnaires or interviews with principals. The data obtained using these instruments should be supplemented with judgements of teachers and other stakeholders in order to contrast the self-images with the perceptions of other persons. It is important, however, that this is augmented by the use of standardized tests, observation methods and document analyses to validate subjective estimations against multiple and more rigorous performance measures.

An Exemplary View on the Focus, Design and Findings of a Recent Study

The study of Tenberg and Pfister (2012) highlights in particular the relation between specific historical contexts and professional traditions of a regional education area, and the school principals' activities. It thereby focuses on organizational and environmental contingencies of leadership practices. The study was initiated because of problems that occurred in the course of qualitative, lesson orientated, and teaching related projects for school development in German vocational schools. It was assumed that these problems were caused by fundamental discrepancies between the traditional understanding of school leadership and modern concepts of human resource management. Therefore, the main target was to investigate teachers' attitudes towards leadership behavior in ten vocational schools in northern Germany participating in the abovementioned projects. First, the aspects of leadership behavior which teachers approve or oppose should be revealed. Second, predictors for the different attitudes of teachers towards leadership behavior were sought.

The theory-based "Need for leadership questionnaire" from de Vries (1997) was not applied in this survey, as the items proved to be too undifferentiated in terms of the empirical requirements of the study. Instead, a new survey instrument with explorative items was developed specifically to suit the criterion. To this end, different models of human resource management tasks were transformed into an eight-factorial ex-post model. Exploratory factor analyses resulted in the following factor structure: *goal-orientation, delegation, issuing instructions, acceptation, criticism, conflict management, initiative, staff control,* and *staff relationships* (Cronbach's alpha between .62 and 0.89).

Consistent with other findings, the teachers' expectations and demands towards leadership were assumed to be determined by the teachers' individual perception of

their professionalism as well as their attitude towards the dynamics of organizational change in schools. Six pivotal hypotheses arose from this presumption: The acceptance of practices of human resource management well established in commercial enterprises

1. decreases with the teacher's claim to autonomy,
2. decreases with the teacher's claim to parity,
3. increases with the teacher's willingness to cooperate with colleagues,
4. increases with the teacher's willingness to innovate,
5. increases with the teacher's target-orientation,
6. increases with the teacher's willingness to continue training.

To check for other potential influencing factors, a number of other socio-demographic and contextual factors were recorded, but correlative results contradicted the postulated hypotheses. Instead, the findings showed that teachers' attitudes towards leadership generally followed a traditional pattern, independently from their expected predictors: The scale-means indicated a widespread rejection of lesson- or teaching-related leadership activities as well as of instructional control. The teachers were especially wary of leadership activities concerning personal matters and collegial conflicts. In contrast, goal-setting or concretion, and the delegation of task and competencies, were widely accepted leadership activities. Criticism and commendation were also accepted as managerial instruments. Although moderate to high standard deviations were found in all scales, neither socio-demographic and work-biographic factors nor the factors "climate of innovation", "autonomy-parity pattern", and "burn-out" could explain the variance.

Finally, a cluster analysis yielded group-specific results. It showed that only one of four distinctive groups of teachers (covering about 25% of the sample), possessed an attitude towards leadership which corresponds with modern concepts of human resource management. In contrast to the three other groups, only the teachers in this group restrained their claim to design lessons individually, and acknowledged instructional controls by the principal. This group was also characterized by its significantly lower level of "claim to autonomy" and "claim to parity", but significantly higher level of "participation in teacher cooperation activities" and "job satisfaction".

With regard to the *mutual relations* between leadership practices and contextual factors located within the organisational level (e.g. characteristics and demands of staff members) that were proposed in the above mentioned analytical framework, the empirical findings of this study point out that an *incompatibility* between the expectations, belief systems, and intentions of concerned parties can provide an important predictor for the success or failure of certain reform measures or school improvement. This incompatibility might also explain why certain prescriptive and scientifically approved concepts of leadership are not employed in schools.

CONCLUDING REMARKS

For a long time school policy and administration have come to appreciate school leadership as a critical factor of school quality and development. Inspired by economic

practice, numerous attempts were made to deliberately change educational organizations by adopting leadership concepts – especially in the last 20 years. But contrary to commercial enterprises, schools turned out to be organizations with more difficult and more specific principles of leadership and followership. The main reasons are clear: Schools neither assemble material products nor provide services. There are neither typical employees nor typical supervisors. The "customers" are children and adolescents who have to be prepared for a self-determined life in a fast changing world.

So it is not surprising that the current status of research into school leadership is not nearly as consistent and detailed as it is for leadership in economic fields of application. The principles of economy in a globalized world caused a kind of alignment, but this is at present not conceivable in the field of education as it is multisegmented by countless paradigms, approaches, and organizational systems with old political and historical roots.

In this article, we sorted and compared empirical approaches to school leadership in Germany and internationally, taking into account the past three centuries. For this purpose we summarized reviews of German studies and analyzed international journals to contrast investigation themes and aims. Although national as well as international approaches generally aim at characterizing the specific relevance and role of the principal in educational institutions, the respective focal points seem to be quite different. Internationally, leadership behavior is the prevalent theme and there is a significant emphasis on efficacy studies related to leadership acting. German studies concentrated largely on the personality of school principals, their role identification and beliefs. The cited example of Tenberg and Pfister showed that such investigations are urgently required to promote a long desired change in German school management, but it also showed that those findings are less relevant for North American school systems.

In conclusion one can say that school leadership cannot be handled as a relatively indifferent object of empirical science all over the word. On the contrary, it is clear that in relation to this topic school-system conditioned educational, professional, sociological and psychological aspects coalesce to a very specific degree and result in very specific principles and effects. Therefore it will be more important for further studies to analyze the appropriate state of science than the state of science which is referred by those ranked journals which dominate the international scene because they refer predominantly to the North American school system. A significant international state of science about school leadership is hugely desirable and can only be achieved by considering the divergence of national or cultural contexts. This will, however, be a very large undertaking due to the significant barriers presented by differences in language as well as in values, cultures, systems and administrations.

REFERENCES

Altrichter, H., Kemethofer, D., & Leitgöb, H. (2012). Ansätze der Systemsteuerung in der Einschätzung von Schulleitern. *Empirische Pädagogik, 26* (1), 12–32.

Bonsen, M. (2006). Wirksame Schulleitung. In H. Buchen, & H.-G. Rolff (Eds.) *Professionswissen Schulleitung.* Weinheim: Beltz.
Brauckmann, S. (2012). Schulleitungshandeln zwischen deconcentration, devolution und delegation (3D) – empirische Annäherungen aus internationaler Perspektive. *Empirische Pädagogik, 26*(1), 78–102.
Bush, T., & Glover, D. (2003). *School Leadership: Concepts and Evidence*. Summary Report, Spring 2003. National College for School Leadership. Retrieved from www.ncsl.org.uk/literaturereviews
De Vries, R. E. (1997). *Need for Leadership. A solution to empirical problems in situational theories of leadership.* Enschede: FEBO Print.
Dubs, R. (2012). Editorial. *Empirische Pädagogik, 26*(1), 2–11.
Hallinger, P. (2011). Leadership for learning: lessons from 40 years of empirical research. *Journal of Educational Administration, 49*(2), 125–142.
Hanushek, E. A., & Woessmann, L. (2010). *The economics of international differences in educational achievement.* Working Paper 15949. National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w15949.
Kranz, T. (2007). *Das Führungsverständnis angehender Schulleiterinnen und Schulleiter*. Norderstedt: Books on Demand GmbH.
Leithwood, K., & Jantzi, D. (2005). A Review of Transformational School Leadership Research 1996–2005. *Leadership and Policy in Schools, (4)*3, 177–199.
Maag Merki, K., & Altrichter, H. (2010). Empirische Erforschung schulischer Governance. Eine Zwischenbilanz und offene Forschungsfragen. In H. Altrichter, & K. Maag Merki (Eds.) *Handbuch Neue Steuerung im Schulsystem.* Wiesbaden: VS Verlag.
Pfeiffer, H. (2002). Forschung zur Schulleitung - Schwerpunkte und Perspektiven. In J. Wissinger, & S. G. Huber (Eds.) *Schulleitung - Forschung und Qualifizierung*. Opladen: Leske, Budrich.
Robinson, V. M. J., Lloyd, C., & Rowe, K. J. (2008). The impact of leadership on student outcomes: Analysis of the differential effects of leadership type. *Educational Administration Quarterly, 44*(5), 635–674.
Rosenbusch, K.-H., & Warwas, J. (2010). Schulleitung als Profession. In R. Pfundtner (Ed.) *Grundwissen Schulleitung I. Handbuch für das Schulmanagement.(2. überarb. u. erw. Aufl.)*. Köln: Carl Link.
Slater, R. O., & Teddlie, C. (1992). Toward a Theory of School Effectiveness and Leadership. *An International Journal of Research, Policy and Practice*, (3)4, 247–257.
Tenberg, R., & Pfister, N. (2012). Welche Erwartungen und Ansprüche stellen Berufsschullehrer an ihre Schulleiter als Führungspersonen? Empirische Untersuchung an beruflichen Schulen. *Empirische Pädagogik, 26* (1), 33–55.
Warwas, J. (2012). *Berufliches Selbstverständnis, Beanspruchung und Bewältigung in der Schulleitung.* Wiesbaden: VS Verlag.
Wissinger, J. (2011). Schulleitung und Schulleitungshandeln. In E. Terhart, H. Bennewitz, & M. Rothland (Eds.) *Handbuch der Forschung zum Lehrerberuf.* Münster: Waxmann.
Zlatkin-Troitschanskaia, O. (2006). *Steuerbarkeit von Bildungssystemen mittels politischer Reformstrategien. Interdisziplinäre theoretische Analyse und empirische Studie zur Erweiterung der Autonomie im öffentlichen Schulwesen.* Frankfurt: Peter Lang.

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MARTIN STUMP

TEACHERS' EVIDENCE-BASED ACTIONS

A Comparison of Different School Types

INTRODUCTION

Currently, there is a dynamic development in the German school system. It is a new governance model which has been designed to have measurable effects on the political regulation of education. In this context, performance standards are being redesigned to ensure that schools have more autonomy in how they reach their goals (Caldwell, 2000). The granting of partial autonomy is based on the assumption that pedagogues can and want to actively support the development of schools and the lessons taught therein (Zlatkin-Troitschanskaia, 2006). Thus, the implementation of innovations is becoming a core task for schools (Breuer & Höhn, 1998). Now teachers not only have the task of designing lessons, but they are also active in some of the processes inherent in developing schools (Dubs, 2009). However, higher autonomy is connected to stronger control, that is, through external evaluations conducted by the state (Caldwell, 2000). Apart from state institutions, international organizations (such as the Organization for Economic Co-operation and Development, OECD) and private providers are generating knowledge on the effects of school systems (van Ackeren, Zlatkin-Troitschanskaia et al., 2011). Thus, the responsible individuals at schools are provided with evidence-based knowledge that is supposed to influence their behavior. Results from studies conducted in schools are expected to confirm that teachers and governing bodies initiate purposeful lesson and school development processes (Coburn & Talbert, 2006). To do so they need to receive and reflect upon evaluation results, develop measures with the help of the available data, and implement them successfully (Kadach & Zlatkin-Troitschanskaia, 2009; Tulodziecki & Breuer, 1992). This means that evidence provided is useful only when it is realized through the development and implementation of school activities.

Basing actions on existing empirical results is gaining importance in partially autonomous schools at the same time as the level of experience of the teachers is gaining importance in the development of the quality of schools (Caldwell, 2000). In other words, school development is becoming connected to a shift of responsibility and competency to the teacher level (van Ackeren et al., 2011).

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In recent years, the question of whether and to what extent teachers and governing bodies are acting based on evidence or making the majority of their decisions based on their everyday knowledge and experience has gained increasing importance in international empiric research (see e.g. Roberts, 2010). The concept of evidence-based governance as part of the new governance model assumes that teachers use empirically proven knowledge when designing lessons and school programs. However, the main problem is that teachers often cannot or do not want to base further actions on conclusions drawn from evaluation data. Hence, some teachers seem to ignore the lesson and school development processes based on empirical evidence that they have been advised to use (Kadach & Zlatkin-Troitschanskaia, 2009). Studies repeatedly have shown[1] that providing data does not ensure that the data will be used to develop and implement changes (Kohler, 2004; 2005; Saunders, 1998; Terhart, 2002). Schrader and Helmke (2004) concluded from Walzer's[2] study that the majority of subjects did not draw on the results of the previously conducted MARKUS[3] study. After having analyzed the reception of a number of German studies (among others, VERA,[4] QuaSUM[5]) as well as two studies by the National Foundation for Educational Research in Great Britain, Schneewind (2007) stated that the behavior of pedagogues did not reflect the results of the studies, even after the teachers had been provided with feedback.

Looking at the existing state of research it can be noted, however, that only a few studies have been conducted that consider the differences in evidence-based action among the various school types, even though such differences have been shown to exist (Ditton, Merz & Edelhäußer, 2002; Peek, 2004). The EviS Project goes one step further than previous studies. It captures not only the reception of data among teachers at different school types but also the teachers' actions based on this data. Hence, the aim of this paper is not to identify specific factors that explain the degree of evidence-based action among teachers; rather, it is to contribute to answering the question of the extent to which teachers use data from evaluations. This paper provides support for the hypothesis that there is a significant variation in the scope of evidence-based action among teachers in the different school types which is caused by school-type specific and personal factors. In particular, the differences in the degree of evidence-based action between teachers in general and teachers in the vocational education system in particular will be analysed because there is a lack of research in this area. We concentrate on the German secondary school system, which includes vocational schools and schools for general education. Schools for general education are divided into three tracks; Hauptschule (basic or lowest academic level), Realschule (general or average academic level), and Gymnasium (advanced or highest academic level). The vocational school system consists of a large number of different school types that provide full-time preparation for vocational training as well as part-time general and vocational teaching with different levels of qualification.

The first step includes a critical analysis of the relevant theoretical and empirical research including a definition of "evidence-based action" (the next section) which then focuses on the state of empirical research and on the above-noted question. In

the third and fourth sections the design and results of the EviS-project,[6] "Evidence-based Practice in the Education System", will be presented respectively. This project started in 2010 at the University of Mainz and the University of Duisburg-Essen under the direction of Professors O. Zlatkin-Troitschanskaia and I. van Ackeren. Our paper ends with some reflections on possible implications for schools, school politics and school practices.

STATE OF THEORETICAL AND EMPIRICAL RESEARCH

Definition of the Term "Evidence-Based Action"

In the context of the German-language discussion about "evidence-based pedagogy", the term "evidence" currently commands a great deal of interest (Sandkühler, 2011), as does its application (Heid, 2011). Evidence-based pedagogy is based mainly on a narrow understanding of the term "evidence" and aims to produce knowledge largely through causal connections that reveal their full potential when they are transferred to the politics of education and educational practice. The underlying strategy is oriented toward strict scientific and theoretical criteria and methodological standards. Three main criteria define evidence-based pedagogy: first, the application of randomized controlled trials; second, experimental designs such as the research method of choice; and third, the generation of knowledge through causal connections explicitly designed to influence pedagogical behavior. In contrast, in German-speaking countries empirical research in education does not coincide with this narrow understanding of evidence or the methods employed for its generation (Bellmann & Müller, 2011).

When defining the term "evidence-based action" it is worthwhile to look at the meaning of pedagogical action. According to Meyer-Wolters (2011), pedagogical action is a highly interdependent process that refers mainly to the mediation of meanings and always to external action. Generally, it means using measures to reach goals. People's expectations concerning the connection between resources used and the extent to which goals have been attained are influenced by preconceptions. These assumptions do not necessarily have to be supported by scientific research; they frequently refer to subjective knowledge gained from experience. Often, pedagogic decisions are based on this kind of knowledge. If action is goal-oriented and measures are being implemented for this purpose, pedagogical action is always connected to subjective suppositions about which goals are desirable and how these best can be achieved. Individual heuristics play a major role in this process (Meyer-Wolters, 2011). Conversely, the concept of evidence-based action explicitly includes the expectation that in pedagogical situations the best available scientific results will be implemented (Meyer-Wolters, 2011).[7]

The definition of evidence-based action used in the following sections refers to the broader understanding of the term "evidence". In this article, evidence-based action is defined as "activities that are planned and conducted based on systematically

gained knowledge, i.e., in the context of scientific studies or external evaluations" (EviS-project, 2011).

Use of Results from Evaluations Conducted in Different Types of Schools

Previous studies have focused on many different factors in order to answer the question of what makes teachers use results from evaluations. Wilson, Hemsley-Brown, Easton and Sharp (2003) showed that there is some enthusiasm for using test results to assist in the development and implementation of programs at schools and that educators use the test results to support current programs. Using test results can lead to new insights and challenges, and improvements to the quality of teaching (Wilson et al., 2003). The authors also express concern, however, that the results of performance tests are not applied sufficiently to the development of school programs, one reason for this might be the scarce availability of results. Furthermore, the authors note that time, encouragement and opportunities are lacking. Thus, reference is made to the obstacles teachers face when they attempt to use test results such as: being unable to find relevant articles; the results proving to be irrelevant and/or impractical; the political climate; and a lack of practical support for implementing progress based on them (Wilson et al., 2003). Williamson and Fitz-Gibbon (1990 as cited in Saunders, 1998) point out a lack of awareness of the advantages of implementing improvements in schools based on evaluation results, a tendency towards low participation in meetings, fragmented reading of articles, and overlooking changes suggested in the results.

Schildkamp and Visscher (2009) examined the factors that lead to successful self-evaluation by schoolteachers. The results of their study in the Netherlands showed that schoolteachers differ in the extent to which they are capable of using the results of self-evaluation to enhance the quality of their schools. Factors that influence the application of a self-evaluation instrument include the teacher's attitude towards self-evaluation, the innovative power of the school, and the agreement between evaluation results and user needs. In addition, the research results of Kirkup, Sizmur, Sturman and Lewis (2005) should be discussed. The authors observe that, on one hand, schoolteachers use the data to improve the performance of students directly, and on the other hand they use the data to improve the quality of the school. A huge challenge for schoolteachers is finding time to deal with the data and finding a suitable system to incorporate the information (Kirkup et al., 2005).

Specific evaluations of how teachers directly use the information gained from assessments and tests conducted by school governing bodies are rare. However, a few German studies have dealt with this question (Kohler & Schrader, 2004). It was shown that at least some target groups of teachers are open to spreading the knowledge gained from the results of empirical evaluations. Of the mathematics teachers surveyed in the QuaSUM study, almost all agreed that the empirically gained results should be reported back to the teachers, and 75 percent agreed that a report should be provided to the school's governing body. However, only 48 percent agreed that a

report should be provided to all colleagues and only 32 percent of teachers surveyed were willing to have the results reported back to their school's supervisory board (Peek, 2004; see also the survey by Ditton et al., 2002). With regard to evidence-based action, willingness to share the data as well as willingness to personally deal with the results both play crucial roles.

At the same time, Schwippert (2004) points out that the availability of information on dealing competently with the reported results – even in countries with experience of testing, such as England – is very restricted. The form of reporting evaluation data seems to need further development. The restricted knowledge of teachers with regard to statistics and research method-related principles makes it more difficult for them to deal competently with the results and school-related performance feedback (Schwippert, 2004). Altogether, the degree to which the evaluation results are dealt with and, if applicable, the consequences they have on individual lessons are not only subject to personal preconditions (i.e., attitudes, knowledge of methods), but also are influenced by institutional factors (Schrader & Helmke, 2004).

Very few studies have been conducted regarding this article's main question of whether there are differences in how evaluation results are dealt with based on school type. Initial indications can be found in the report of Ditton et al. (2002) on the results of a survey of teachers and governing bodies from the various secondary school types. It showed that teachers from Gymnasium[8] and Realschulen[9] were more interested in the results of their evaluations than teachers at Hauptschulen.[10] A similar result was found regarding the publication of the evaluated data: 14.6 percent of teachers at Hauptschule agreed to publication, while 26.7 percent of teachers at Realschule and 25 percent of teachers at Gymnasium agreed (Ditton et al., 2002). When evaluating the opinions of school governing bodies, however, we found different results: governing bodies of Realschulen (25 percent) agreed to publication twice as often as governing bodies of Hauptschule (12.5 percent) and Gymnasium (11.9 percent). Governing bodies of Gymnasium, the schools with the highest academic level, most often voted for feedback to be provided solely to the school itself (Ditton et al., 2002).

Peek (2004) also questioned teachers from different types of schools during the QuaSUM study. However, he took it one step further and focused on individual ways of dealing with evaluation results and their consequences. Of teachers at Gesamtschule[11], 92 percent stated that they dealt with their feedback, as did 86 percent of teachers at Realschule and 91 percent of teachers at Gymnasium. There are clear differences in intensity, measured by the length of time spent on the results: on average, teachers at Gesamtschule dealt with the results for 2.18 hours; teachers at Realschule for 2.74 hours; and teachers at Gymnasium for 2.96 hours (Peek, 2004). The responses to the question of whether the teachers made any changes as a result of their feedback were interesting: only 20 percent of teachers with students aged 10 and 11 and 17 percent of teachers with students aged 14 and 15 stated that they did. Generally, the changes they made can be divided into three areas: (1) adoption of contents for individual lesson planning; (2) dealing with the methods and

goals of their individual lessons; and (3) subject-related cooperation with colleagues (Peek, 2004). Differentiating among type of school makes it clear that in secondary schools (Gesamtschulen, Realschulen and Gymnasium) changes are made with particular regard to consulting about: (1) aspects of diagnosis and grading; and (2) joint agreements and cooperative actions that partially concern the lessons themselves (Peek, 2004).

Few empirical comparison studies exist on evidence-based action in vocational schools. However, these comparisons are increasingly important due to the many restructurings that have taken place in the high school system, for example, abolition of the Hauptschule, further development of integrated comprehensive schools (Gesamtschule), and the implementation of Realschule Plus[12] which can be described as job-oriented secondary school. These changes have led to dramatic consequences including some restructuring of the sector governing vocational schools. Therefore, one of the focuses of this research as part of the EviS Project is on a comparison of high school types. This will be presented in the following chapter.

EVIS-PROJECT: RESEARCH DESIGN, SAMPLE AND EVALUATION INSTRUMENT

An interdisciplinary research association was founded in 2010 to explore evidence-based practice in the multi-level school system with the aim of gaining comprehensive data regarding whether evidence-based knowledge is being absorbed, relayed and used, and if it is, how and to what extent it influences the development of professional and organizational practices, processes and structures at schools. This three-year association is part of the new research focus on governance in the educational system and is funded by the Federal Ministry for Education and Research, Germany. Within the EviS Project we used a multilevel approach to analyze evidence-based practice in different school types and its conditions, processes and effects.

Thus, in 2011 a lateral survey was conducted in which 2936 teachers in 153 schools of all types (primary, secondary; general, vocational) responded to questions on their evidence-based knowledge and actions. The statistics reported in this paper are based on a portion of the data (excluding primary schools) obtained from 1387 teachers at 121 general-education and vocational schools in the federal state of Rhineland-Palatine.[13] The teachers' written responses regarding evidence-based actions at their schools were evaluated. The distribution according to the type of school can be seen in Table 1.

The survey responses were assessed using various approved and validated scales. A number of scales was used in the present survey to measure differences related to school type in the evidence-based action of teachers including the *Evidence-based Action* scale by Stumm, Dormann and Mohr (2010) (for example: "At our school new developments are documented by scientific surveys"). In order to survey possible differences in evidence-based action, we used the *Climate for Self-Initiative* scale by Baer and Frese (2003) (for example: "If there are opportunities for redesigning lessons, my colleagues at school use them") and a scale on the leadership

style of the governing body, in particular, the *Transformational Leadership* scale by Bass, Avolio, Jung and Berson (2003) and Felfe (2006) (for example: "My school principal knows about my individual needs, abilities and goals").

Table 1. Number of schools and teachers by type of school

Type of Secondary School		*Number of Schools*	*Number of Teachers*
Schools for General Education	Förderschule[14]	34	252
	Realschule Plus	27	280
	Gymnasium	18	239
	Gesamtschule	11	126
Schools for Vocational Education	Vocational School[15]	31	490
	Total	121	1387

In addition, the *Support Evidence-based Action in the Field of Communication* scale (Stumm, Dormann & Mohr, 2010; for example: "At our school we have access to the Internet and the intranet to retrieve information on topical, job-related developments") and the *Support Evidence-based Action in the Field of Participation* scale (Stumm, Dormann & Mohr, 2010; for example: "The teachers have a say in decisions that affect their jobs") were administered. All items were scored on a five-point Likert scale ranging from 1 "I do not agree" to 5 "I absolutely agree", except the items on the scale *Transformational Leadership*. This scale ranged from 1 "never" to 5 "almost always." A number of important control factors such as age, gender etc., were included.

FIRST RESULTS

As a first step, the hypothesis "There is a significant difference between evidence-based action in general-education schools and in vocational schools" was investigated using mean value tests. The results showed that the average on the scale of *evidence-based action* was 3.15 for the general-education schools and was slightly lower for the vocational schools at 2.96. This difference is not high, but it is significant. As described, the measure *Evidence-based Action* is based on a five-point Likert scale. Thus, an average of 3.0 indicates that the subjects partially agree with the statement that they act based on evidence. The two averages of 2.96 and 3.15 indicate that generally the subjects act to a very limited extent based on evidence. Obviously, other bases for decision-making play an important role as well. With regard to the politically inspired functioning of the new governance model, this result is rather negative.

Within the vocational schools the results showed no significant differences in averages between school principals and teachers, or between whether or not teachers deal with developing the quality of their schools. However, there were some more significant differences between teachers at general-education schools and teachers at vocational schools. These differences will be scrutinized later in the overall context of the goal-oriented questions addressed in this paper.

Table 2. Mean values of the scales used

	Vocational Schools	*General-Education Schools*
Evidence-based action	2.96	3.15
Transformational leadership	3.15	3.39
Climate for self-initiative	3.45	3.71
Support evidence-based action in field of communication	3.09	3.18
Support evidence-based action in field of participation	3.13	3.37

As a further step, regression analyses were applied to check which factors explain the differences between general-education and vocational schools. A minimum of one factor was included in the analysis to at least partially assess the school principal and organizational levels: *transformational leadership* and *support of evidence-based action in the field of participation*. The analyses showed that the four above-stated factors already explain the majority of the total variance (R^2=0.565; p=0.000) in the *evidence-based action* factor. *Transformational leadership* (beta coefficient=0.277) showed a stronger influence than *support of evidence-based action in the field of participation* (beta coefficient=0.261), *climate for self-initiative* (beta coefficient=0.231) and *support evidence-based action in field of communication* (beta coefficient=0.189). The mean comparisons between the general-education and vocational schools showed that the averages of all factors were significantly lower in vocational schools than in general-education schools.

To sum up, the majority of teachers at our schools only act based upon evidence to a minimal extent. However, there are clear differences between general-education and vocational schools. This result is rather unexpected, since relevant research until now has indicated that vocational schools have implemented more reforms and innovations than general-education schools. Thus, it was expected that *evidence-based action* would also be more widespread in vocational schools. With regard to the results of the EviS Project, another hypothesis can be generated that would be worth testing: more reforms and innovations do not necessarily go hand in hand with stronger evidence-based action at schools. Also, whether the implementation of school and lesson innovations is conducted based upon evidence at the teacher level or is politically motivated should be controlled for. Quite likely the relevant answers will have far-reaching consequences because a self-evidence basis is the

main criterion of the new governance model (see above). Within the new output-oriented governance model and its instruments (such as school inspections, comparable state-wide tests or internal evaluations), very comprehensive empirically-based school development and governance knowledge is available to teachers. The successful implementation of school development and innovation measures and thus the efficiency of the new governance model do not necessarily imply knowledge of the new expertise on offer alone, but it does imply an especially competent way of dealing with the new expertise with respect to evidence-based action.

Furthermore, the EviS Project results show that evidence-based action at schools is influenced by various school-specific factors. The strongest influence is the *school principal's behavior*. The transformational type of leadership is especially suitable during organizational changes. For example, a school principal can increase the staff's motivation through offering appealing visions of how the school can develop, by being a model for behavior him- or herself, and by supporting the teachers' professional development (Felfe, 2006; Harazd & van Ophuysen, 2011). The results emphasize that transformational leadership can influence evidence-based action among teachers positively. In general, the school principal's key role is well known from relevant school research (Huber, 2008; van de Grift & Houtveen, 1999). There are, however, significant differences between vocational and general-education schools that need to be evaluated, for example, with respect to the size and complex structure of vocational schools. The results of a quality study conducted at nine vocational schools in Rhineland-Palatinate by Kadach and Zlatkin-Troitschanskaia (2009) showed that most of the vocational schools offer a multitude of courses, very often conducted at different sites. The study also revealed that the school principal's behavior was scrutinized more critically in larger schools, especially those with multiple premises. Another reason for some of the differences between the school types might be the questions asked in the study, because the teachers were always asked about the composition of the school's internal hierarchy and its governance functions. Due to the size and complex structure of vocational schools, their hierarchies are comprised of far more people than those at general-education schools. In line with the theory that the assessment of more people is more heterogeneous, this higher heterogeneity might be reflected in the average value.

Another parameter can be subsumed under the term *school climate*. The results show that a positive school climate can lead to a higher degree of evidence-based action among teachers. The high importance of climate factors is undisputed in school research. In particular, personal autonomy is seen as one of the strongest influences on teachers' willingness to participate in innovation and reform – this is most often regarded as a positive connection. The results of the EviS Project suggest that the climate can influence personal initiative in the sense that a strongly felt sense of self-determination also can promote evidence-based action.

All in all, the first EviS Project results suggest that the level of evidence-based action is lower in vocational school teachers than in general-education school teachers. This result should be evaluated further as part of a qualitative sub-study. Such

qualitative analyses might deliver important suggestions regarding how such differences among different types of schools develop and which type-specific factors can help to explain them.

CONCLUSION

The analyses of the existing evidence in this paper, as well as of the empirical results of the EviS Project indicate that the way in which schools deal with empirically gained results and feedback cannot be generalized. Rather, they have to be differentiated due to the high structural and institutional heterogeneity of the school system. The studies at hand indicate that teachers regard separate feedback on school and lesson quality as especially informative and understandable, but also regard it as useful for lesson development only to a limited extent (Schrader & Helmke, 2004; Young, 2006). This can be an indicator of the assumption that teachers' behavior is rarely based on such results and feedback. The first results of the EviS Project support this assumption since the majority of the teachers surveyed stated that they did not act or only acted to a limited extent based upon evidence.

Furthermore, contrary to the assumptions suggested by earlier research, the EviS Project results showed differences between the effects of evidence-based action, to the detriment of vocational schools. However, more research is needed on why these differences exist and what factors might be causing these two types of schools to be influenced in different ways. Independent of the type of school, certain factors – such as the behavior of the governing body, the school climate, and communication among colleagues – are seen as important when dealing with evaluation results. The EviS Project results can support a major result of the studies: in schools where teachers feel the general climate to be positive, teachers spend more time dealing with feedback from the results of studies (Peek, 2004).

In conclusion, the results of the EviS Project show a good connectivity between the existing national and international research. At the same time, however, they generate critical questions with regard to evidence-based educational governance which should be evaluated in follow-up studies. The aspect of teacher professionalism at the various types of schools and the consequences or effects on evidence-based action is currently being evaluated in a subproject of the EviS Project under the direction of Prof. O. Zlatkin-Troitschanskaia. The genesis, preconditions, development and determinants of dealing professionally with students, teachers-in-training and in-service teachers are being compared systematically and evaluated with regard to the results of evaluations of the different types of schools.

NOTES

[1] The literature also shows some counter-examples, however. In a non-representative written evaluation, about 90 percent of the teachers stated that they modified their lessons due to feedback (Hosenfeld, Groß Ophoff & Koch, 2007).

[2] This study focuses on the analysis of performance, the evaluation of achievements, and the proper use of evaluation results for the benefit of schools.

[3] This study includes the assessment of mathematics competencies, lesson characteristics and school contexts in Rhineland-Palatinate (Helmke & Jäger, 2002).

[4] In the VERA study, nation-wide tests were developed to compare the learning outcomes in mathematics of German students with those of foreign-language students.

[5] The members of the QuaSUM research group are examining the quality and learning outcomes of mathematics lessons.

[6] The EviS-project is being funded for three years and is part of the new research focus on Educational Governance by the Federal Ministry of Education and Research (project number: 01JG1010A, for further information see http://www.empirische-bildungsforschung-bmbf.de/zeigen_e.html?seite=8835).

[7] See Bellmann and Müller (2011) for a critical examination of the use of the term "evidence-based action" in educational research and practice.

[8] *Gymnasium* schools offer the highest level of academic study available in Germany. Students aged 10 to 19 attend the Gymnasium to gain A-levels so they can continue their studies at university level.

[9] Students aged 10 to 16 attend *Realschule*. After graduation (after attending school for a total of 10 years) they can study at vocational schools.

[10] *Hauptschule* is quite similar to Realschule, but students can graduate at the age of 15 (after attending school for a total of nine years) and gain a more basic education than pupils in Realschule.

[11] *Gesamtschule* is similar to comprehensive school and offers students the opportunity to study for various qualifications. To take into account their different abilities and interests, at the age of about 11 students get to choose some of their subjects. The main subjects are taught to students aged 12 and above in various courses, at different levels. Students can leave school at the age of 16 or can continue studying to gain their A-levels.

[12] Students aged 10 to 15 or 16 attend *Realschule Plus*. They are offered the opportunity to gain their A-levels by attending an additional two-year program which allows them to study at a university of applied sciences. To support students further, special opportunities such as job-related measures are available (see http://bildung-rp.de/schularten.html).

[13] Rhineland-Palatine is one of Germany´s 16 federal states.

[14] Förderschulen are schools for mentally or physically challenged students or students with learning disabilities. This type of school leads to qualifications that accord with the opportunities available to individual students. The lessons prepare the students for jobs and/or apprenticeships. The goal is for the student to be able to reach a high level of social participation and to live independently (see http://bildung-rp.de/schularten.html).

[15] Students in vocational schools are taught job-related and general-education competencies. Students gain a qualification focused on a specific job or field of employment. Various types of schools are subsumed under the term vocational schools.

REFERENCES

Baer, M., & Frese, M. (2003). Innovation is not enough: Climates for initiative and psychological safety process innovations, and firm performance. *Journal of Organizational Behavior, 24*, 45–68.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology, 88*(2), 207–218.

Bellmann, J., & Müller, T. (Eds.) (2011). *Wissen, was wirkt: Kritik evidenzbasierter Pädagogik* (1st ed.) [Knowing what affects: critical analysis of evidence-based pedagogy]. Wiesbaden: VS Verlag.

Breuer, K., & Höhn, K. (1998). Die Implementation eines Qualitätsföderungssystems für berufliche Abschlußprüfungen – Eine Interventionsstudie am Beispiel des neu geordneten Ausbildungsberufs Versicherungskaufmann/Versicherungskauffrau [Intervention study on the implementation of a quality improvement system for final examinations of insurance clerks]. *Unterrichtswissenschaft, 26*(4), 348–364.

Caldwell, B. J. (2000). Scenarios for Leadership and Abandonment in the Transformation of Schools. *School Effectiveness and School Improvement: An International Journal of Research, Policy and Practice, 11*(4), 475–499.

Coburn, C. E., & Talbert, J. E. (2006).Conceptions of Evidence Use in School Districts: Mapping the Terrain. *American Journal of Education, 112*(4), 469–495.

Ditton, H., Merz, D., & Edelhäußer, T. (2002). Einstellungen von Lehrkräften und Schulleiter/ innen zu zentralen Testuntersuchungen an Schulen [Teacher's and head teacher's attitudes towards assessments at schools]. *Empirische Pädagogik*, *16*(1), 17–33.

Dubs, R. (2009). Leitungsstrukturen in Bildungsorganisationen: Leadership und die Folgen für die Professionalität von Lehrenden [Leadership in educational organizations: Leadership and its influence on teacher's professionality]. In O. Zlatkin-Troitschanskaia (Ed.) *Lehrerprofessionalität*. Weinheim: Beltz, 503–515.

EviS-project (2011). *Evidenzbasiertes Handeln im schulischen Mehrebenensystem – Bedingungen, Prozesse und Wirkungen* [A Multilevel Approach to Evidence-based Practice in the Educational System - Conditions, Processes and Effects]. Retrieved from http://www.empirische-bildungsforschung-bmbf.de/zeigen_e.html?seite=8835.

Felfe, J. (2006). Validierung einer deutschen Version des "Multifactor Leadership Questionnaire" (MLQ Form 5 x Short) von Bass und Avolio (1995) [Validation of a German version of the „Multifactor Leadership Questionnaire" by Bass and Aviolio, 1995]. *Zeitschrift für Arbeits- und Organisationspsychologie*, *50*(2), 61–78.

Harazd, B., & van Ophuysen, S. (2011). Transformationale Führung in Schulen. Der Einsatz des "Multifactor Leadership Questionnaire" [Transformationalleadership in schools: The application of the "Mulitfactor Leadership Questionnaire"]. *Journal for Educational Research Online*, *3*(1), 141–167.

Heid, H. (2011). Über Bedingungen der Anwendung erziehungswissenschaftlichen Wissens [Conditions of the application of pedagogical knowledge]. In O. Zlatkin-Troitschanskaia (Ed.) *Stationen empirischer Bildungsforschung. Traditionslinien und Perspektiven; Klaus Beck zum 70. Geburtstag gewidmet* (1st ed.). Wiesbaden: VS Verlag, 490–508.

Helmke, A., & Jäger, R. S. (2002). *Die Studie MARKUS - Mathematik-Gesamterhebung Rheinland-Pfalz: Kompetenzen, Unterrichtsmerkmale, Schulkontext* [The study MARKUS - Survey of mathematic achievements in Rhineland-Palatinate: Competences, characteristics of the lessons and school's context]. Landau: Empirische Pädagogik.

Hosenfeld, I., Groß Ophoff, J., & Koch, U. (2007). *Vergleichsarbeiten in Klassenstufe 3 („VERA 3") - Konzept und empirische Befunde zum Umgang mit den Ergebnisrückmeldungen in den Schulen: Präsentation bei der 7 EMSE Tagung in Mainz* [Comparative tests in class level 3 („VERA 3") – Concepts and empirical results on how teachers use feedback given at schools. Presentation at the 7 EMSE conference in Mainz]. Landau: Universität Koblenz-Landau.

Huber, S. G. (2008). Steuerungshandeln schulischer Führungskräfte aus Sicht der Schulleitungsforschung [Leadership in schools from the perspective of head teacher's research]. In R. Langer (Ed.) *‚Warum tun die das?'. Governanceanalysen zum Steuerungshandeln in der Schulentwicklung*. Wiesbaden: VS Verlag, 95–126.

Kadach, A., & Zlatkin-Troitschanskaia, O. (2009). Wirksamkeit der internen Evaluation als einzelschulisches Steuerungsinstrument [Effectiveness of internal evaluation as a part of school management]. In W. Böttcher, J. N. Dicke, & H. Ziegler (Eds.) *Evidenzbasierte Bildung. Wirkungsevaluation in Bildungspolitik und pädagogischer Praxis*. Münster: Waxmann, 227–238.

Kirkup, C., Sizmur, J., Sturman, L., & Lewis, K. (2005). *Schools' Use of Data in Teaching and Learning*. Research Report RR671. National Foundation for Educational Research.

Kohler, B. (2004). Zur Rezeption externer Evaluation durch Lehrkräfte, Eltern sowie Beamte der Schulaufsicht [Reception of external evaluation by teachers, parents and school inspectors]. *Empirische Pädagogik*, *18*(1), 18–39.

Kohler, B. (2005). *Rezeption internationaler Schulleistungsstudien* [Reception of international school assessment studies]. Münster: Waxmann.

Kohler, B., & Schrader, F.-W. (2004). Ergebnisrückmeldung und Rezeption: Von der externen Evaluation zur Entwicklung von Schule und Unterricht [Feedback and reception: From external evaluation to the improvement of schools and teaching]. *Empirische Pädagogik*, *18*(1), 3–17.

Meyer-Wolters, H. (2011). Evidenzbasiertes pädagogisches Handeln [Evidence-based pedagogical action]. In J. Bellmann, & T. Müller (Eds.) *Wissen, was wirkt. Kritik evidenzbasierter Pädagogik* (1st ed.). Wiesbaden: VS Verlag, 147–172.

Peek, R. (2004). Qualitätsuntersuchung an Schulen zum Unterricht in Mathematik (QuaSUM) - Klassenbezogene Ergebnisrückmeldungen und ihre Rezeption in Brandenburger Schulen [Quality research in schools on lessons in mathematics (QuaSUM) – Results and reception in schools in Brandenburg]. *Empirische Pädagogik*, *18*(1), 82–114.

Roberts, M. (2010). What Is "Evidence-Based Practice" in Geography Education? *International Research in Geographical and Environmental Education, 19*(2), 91–95.

Sandkühler, H. (2011). Kritik der Evidenz [Criticism of evidence]. In J. Bellmann, & T. Müller (Eds.) *Wissen, was wirkt. Kritik evidenzbasierter Pädagogik* (1st ed.). Wiesbaden: VS Verlag, 33–55.

Saunders, L. (1998). *"Value added" measurement of school effectiveness: an overview.* Berkshire: National Foundation for Educational Research.

Schildkamp, K., & Visscher, A. (2009). Factors influencing the utilisation of a school self-evaluation instrument. *Studies in Educational Evaluation, 35*(4), 150–159.

Schneewind, J. (2007). *Wie Lehrkräfte mit Ergebnisrückmeldungen aus Schulleistungsstudien umgehen. Ergebnisse aus Befragungen von Berliner Grundschullehrerinnen* [How teachers deal with feedback from school achievement tests. Results of a surveys of Berlin's teachers in elementary schools]. Freie Universität Berlin, Berlin. Retrieved from http://www.diss.fu-berlin.de/diss/receive/FUDISS_thesis_000000002819.

Schrader, F.-W., & Helmke, A. (2004). Von der Evaluation zur Innovation? Die Rezeptionsstudie WALZER: Ergebnisse der Lehrerbefragung [From evaluation to innovation? The reception study WALZER: Results of a teacher survey]. *Empirische Pädagogik*, *18*(1), 140–161.

Schwippert, K. (2004). Leistungsrückmeldungen an Grundschulen im Rahmen der Internationalen Grundschul-Lese-Untersuchung (IGLU) [Feedback on learning achievements in reading for elementary schools (IGLU)]. *Empirische Pädagogik, 18*(1), 62–81.

Stumm, S., Dormann, C., & Mohr, N. (2010). *Evidenzbasiertes Management als Schlüssel für den Transfer zwischen Wissenschaft und unternehmerischer Praxis* [Evidence-based management as a key factor for transfer between science and entrepreneurial practice]. Vortrag auf dem 47. Kongress der Deutschen Gesellschaft für Psychologie, Bremen.

Terhart, E. (2002). Wie können die Ergebnisse von vergleichenden Leistungsstudien systematisch zur Qualitätsverbesserung in Schulen genutzt werden? [How can results of comparative studies systematically be used for the improvement of schools?]. *Zeitschrift für Pädagogik*, *48*(1), 91–110.

Tulodziecki, G., & Breuer, K. (Mitarbeit) (1992). Entwurf von Unterrichtskonzepten [Development of teaching concepts]. In G. Tulodziecki, K. Breuer, & A. Hauf (Eds.) *Konzepte für das berufliche Lehren und Lernen* (3. Aufl.). Bad Heilbrunn: Klinkhardt & Handwerk und Technik, 13–59.

van Ackeren, I., Zlatkin-Troitschanskaia, O., Binnewies, C., Clausen, M., Dormann, C., Preisendörfer, P., et al. (2011). Evidenzbasierte Schulentwicklung: Ein Forschungsüberblick aus interdisziplinärer Perspektive [Evidence-based school development: Overview of research from an interdisciplinary perspective]. *Die deutsche Schule*, *103*(2), 170–184.

van de Grift, W., & Houtveen, A. A. M. (1999). Educational leadership and pupil achievement in primary education. *School Effectiveness and School Improvement: An International Journal of Research, Policy and Practice, 10*(4), 373–389.

Wilson, R., Hemsley-Brown, J., Easton, C., & Sharp, C. (2003). *Using research for school improvement: the LEA's role.* Berkshire: National Foundation for Educational Research.

Young, V. M. (2006). Teachers' Use of Data: Loose Coupling, Agenda Setting, and Team Norms. *American Journal of Education, 112*(4), 521–548.

Zlatkin-Troitschanskaia, O. (2006). *Steuerbarkeit von Bildungssystemen mittels politischer Reformstrategien. Interdisziplinäre theoretische Analyse und empirische Studie zur Erweiterung der*

Autonomie im öffentlichen Schulwesen [Governance of educational systems by using political reform strategies. Interdisciplinary theoretical analysis and empirical study about the enlargement of the autonomy in the public schools]. Frankfurt: Peter Lang.

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IS THE GERMAN QUALIFICATIONS FRAMEWORK AN INSTRUMENT THAT CONTRIBUTES TO PERMEABILITY AND PROGRESSION WITHIN THE VET SYSTEM? – AN INTERNATIONAL PERSPECTIVE

INTRODUCTION

The European Qualifications Framework (EQF) can be seen as a starting point from which the various vocational education and training (VET) systems in Europe are challenged to establish their respective National Qualifications Frameworks (NQFs), complying with the so-called Lisbon-Copenhagen-Maastricht Process (Dunkel & Jones, 2006). One implication is the political objective to open up education and VET systems in the context of concepts such as the "learning economy" or "lifelong learning". One of the key-stones of the "European Union (…) lifelong learning agenda" hereby is the concept of "Competence-based Training" (CBT), which emphasizes that competences can be developed in various ways, "irrespective of the routes of acquisition" (Westerhuis, 2011, p. 68), i.e. learning outcomes should be independent of the context in which learning takes place (Misko, 1999). Another facet is sorting existing qualifications along (competence) dimensions and levels which are based on general descriptors. VET systems with a strong focus on initial training obviously face the most serious challenges here. The "nation-specific" strategy of Germany is to link two worlds; keeping the well functioning elements of the VET system (such as the dual system of apprenticeship training) stable while at the same time trying to cope with the prominent "European issues" such as "informal learning", "modularization" and "accreditation of prior learning". Another issue is the transition from VET to higher education which is seen as an integral element of a more "open" educational architecture, while hitherto sub-systems in Germany (above all the school system and VET) have been working as traditionally clearly segregated entities with hardly any competence-relevant links between each other.

With respect to VET provision in a given country, there is a historical character of the VET system which determines its structures and function, including its links to the labor market. This means that the general significance given to apprenticeship as one specific institutional and didactical solution to the problem of skill formation can differ, mostly depending on the availability of alternative or socially preferred pathways and qualifications. Besides the apprenticeship system, school-based forms of vocational learning, such as vocational colleges (e.g. in the federal state

K. Beck and O. Zlatkin-Troitschanskaia (Eds.), From Diagnostics to Learning Success: Proceedings in Vocational Education and Training, 295–308.

of Baden-Württemberg, cf. Deissinger, Smith & Pickersgill, 2006) represent more or less traditional courses and qualifications which are normally institution-based, shaped by state influence, providing underpinning knowledge for work-based training, but they can also function as purely theoretical alternatives to workplace learning. Experiences with these school-based sub-systems stretch from highly labor-market relevant training provision (e.g. in Austria, cf. Aff, 2006) to more or less ambivalent functions of vocational schools (e.g. in France, cf. Ott & Deissinger, 2010).

An important overarching issue, besides institutionalization, seems to be the social and economic understanding of various vocational pathways (Harris & Deissinger, 2003), but also the evaluation given to VET in general, which becomes clearly manifest when we look at the challenges imposed by the European Qualifications Framework. It is understood that countries which differ in terms of their VET systems and underlying traditions, especially with respect to the relationship between full-time VET and company-based training, also differ in terms of their capacity to adapt to the European VET policy agenda, above all when it comes to National Qualifications Frameworks (Young, 2003).

Germany's NQF (*Deutscher Qualifikationsrahmen* or DQR), under development for five years now (Deissinger, 2009; Esser, 2012), requires a re-definition of borders, pathways, levels and transition options between (a) VET and other educational sub-systems, but also (b) between sub-systems within the VET architecture, such as full-time VET, vocational preparation or foundation courses, or further training. This paper focuses on open issues and obvious areas of tension associated with the EQF/NQF paradigm, and picks up those limitations of the German VET system which are responsible for profound differences between the German learning culture, which is basically an "apprenticeship culture", and the English case. Tensions arise if this means not just to comply with European concepts in a formal way, but when it comes to questioning established structures which are barriers – also from a national perspective – for progression and permeability within the education system.

THE ENGLISH "BLUEPRINT": THE DIFFICULTY OF ESTABLISHING QUALITY IN THE FACE OF A NATIONAL QUALIFICATIONS FRAMEWORK

It is generally understood that the European framework concept has its roots in what happened in England (and the UK in general) in the area of VET policy in the 1980s and, at the same time, in a specific understanding of "competence" typical of the Anglo-American or Anglo-Saxon approach, which consists in the (behavioristic) conviction that learning should be focused on "someone's ability to perform, rather than demonstrating the possession of knowledge" (Westerhuis, 2011, p. 77). The outcomes-based approach to qualifications obviously lies behind "English innovations" such as NVQs (National Vocational Qualifications) and modularization (Brockmann, Clarke & Winch, 2010, p. 91). Hereby, work-based learning "should be confined to the immediate requirements of acquiring the skills associated with

a particular job or task" – with the implication that learning beyond this scope is not just "regarded as superfluous, but a positive hindrance to effective working" (ibid., p. 92).

One of the crucial characteristic features of VET in England, which appears to be a perfect breeding ground for these ideas, is that "learning on the job is often the only way to acquire skills, unlike in other countries with comprehensive and intense programmes of initial skill formation covering almost all new entrants into the industry and taking place in colleges and workshops and on sites" (Clarke & Winch, 2006, p. 78). Correspondingly, England has become the protagonist of the "framework concept", establishing a National Qualifications Framework as early as in the late 1980s (Jessup, 1991). However, the general political motives which Keating describes as supporting "strong and accessible qualifications pathways, a transparent qualifications system, and one that facilitates lifelong learning" (Keating, 2008, p. 1), were not the only underlying convictions when the country, in 1986, introduced NVQs for work-based learning. The main purpose was to offer "a means of obtaining credit for work-based activities" by providing "a structure for the work placement which culminates in a portfolio of evidence" (Morgan, 1997, p. 186). At the same time, in Wolf's words, NVQs were designed to "cover a particular area of work, at a specific level of achievement". "Competence" hereby was "based on the fundamental assumption that, for each industry, there exists a single identifiable model of what 'competent' performance entails. The idea that, for each role, there exists such an agreed notion of competence, which can be elicited and command consensus, is fundamental to any assessment system of this type" (Wolf, 1998, p. 210). Therefore, one of the central ideas of the English framework approach is the combination of "levels", "competence dimensions" and "qualifications".

Although the English apprenticeship system "arose out of the need to stimulate the supply of intermediate-level skills in the economy in the 1990s" and clearly was "the mainstream successor to a range of Government-funded training schemes" (Hogarth, Gambin & Hasluck, 2012, p. 52; cf. Deissinger & Greuling, 1994), its present structure also contains elements which point to "progression routes" and permeability between VET and higher education. The idea of an NQF came up in the 1990s, as a follow-up development to NVQs in the late 1980s (Young, 2003). Its purpose has been to act as an umbrella for school-based, vocational and academic qualifications, as well as providing pathways for progression in the education system (at least in theory) through to postgraduate and doctoral studies. Whereas Germany still operates with a one-standard notion of apprenticeship (due to training duration of mostly three years), in England apprenticeships are not confined to initial training, but can be delivered on three levels, including a kind of "pre-stage" or "sub-academic" variant leading into the higher education sector (cf. www.apprenticeships.org.uk). The programme distinguishes between Intermediate Level Apprenticeships, Advanced Level Apprenticeships and Higher Apprenticeships, on levels two, three and four respectively. Apprentices work towards qualifications that are located in the Qualifications and Credit Framework (QCF), e.g. a Professional Diploma, with this

framework corresponding with the Framework for Higher Education Qualifications (FHEQ). These frameworks may be called spin-off products of the NQF. However, not all apprenticeships lead, through a Higher Apprenticeship, into the degree section of the NQF, which offers "Foundation Degrees" as a pre-stage to undergraduate studies.

Leveling initial training within the NQF means that boundaries between various sectors of the educational and/or training system, including higher and further education, are no longer defined as culturally determined entities with demarcations and functional specifities, but are more and more considered as permeable sub-systems of one system which bears the functional label of "lifelong learning". This statement should not, however, ignore the massive quality problems within the English VET system and the problem of reputation and social acceptance in relation to academic qualifications that are more portable on the labor market than vocational ones (Bynner, 2011, p. 20).

As already mentioned, lifelong learning with the framework concept relies on a specific understanding of "competence" but also requires "open" training markets without strong formal regulation (Harris, 2001). The idea of a flexible, individual and ongoing acquisition of competences which should be independent from institutions, courses and curricula also provides the basis for a new understanding of learning and assessment (Wolf, 1998), such as recognition of prior learning (RPL) or accreditation of prior experiential learning (APEL).

It is interesting, though, that the problems for VET in England lie, in the first place, not only in this characterization of the reference point of learning being "ready-to-hand tasks in the workplace" (Brockmann et al., 2010, p. 92), but in the heterogeneous character and quality of vocational education as such, with the apprenticeship system clearly being one of the weakest elements. Terminology problems occur with the various meanings of sub-types of VET, mixing "apprenticeship", "vocational education" and "training", with a clear tendency to define anything belonging to the vocational sphere in a narrow, "non-expansive" sense, once again indicating a specific understanding of competence which corresponds with the importance of this concept, originally emerging in the sphere of vocational training, in the international debate. Brockmann, Clarke and Winch report this when they mention the historical heritage of a traditional combination of workplace learning with some form of off-the-job instruction and theoretical knowledge relevant to the respective occupation or field of activity which "never succeeded in establishing themselves as major alternative routes from school to work", let alone in standing for "sufficient prestige to gain widespread confidence and recognition from the government, parents, young people, trade unions and employers" (ibid.; cf. Winch & Hyland, 2007). What is typical for the English "vocational patient" against this background, and also a manifestation of a cultural past that did not allow VET in general to become the focus of employers and the state alike (in contrast with the German counterpart), is the fact that all the programs, initiatives and terminological inventions from the 1970s onwards failed to lead to substantial changes in the perception of VET as such, or

to substantial changes in the system. Major researchers in the UK (Unwin, 1999; Ryan, 2001; Bynner, 2011; Fuller & Unwin, 2011) pick up these issues constantly by pointing, above all, to the pedagogical deficits of the English approach which results from discounting the importance of educational elements in VET programs on the one side, and from sticking to a strict terminological divide between "education" and "training" on the other. There seems to be an obvious paradox in that a country with a poor reputation for vocational education comes up with a conceptual innovation such as a National Vocational Qualifications Framework, which the government commanded to be installed when dissatisfaction with VET continued to persist in the 1980s.

Another trait of English VET, which leads us to question whether this is really a pure "market model" of skill formation (Greinert, 1988), is that there is a strong school-based route into employment. This route, due to distrust of company-based training and lack of commitment from employers, holds the advantage that VET provision is more comprehensive and theory-based, i.e. more occupational than most training leading to NVQs, but is considered to have "limited scope for employment" (Brockmann et al., 2010, p. 93). This means that we encounter "two worlds" in the English VET system due to a widening gap between school-based and work-based pathways (ibid.) as one expression of institutional demarcation lines between (general or general vocational) academic and vocational education in England.

The contrast between the Anglo-Saxon approach to VET and the German one has, for a number of decades, been a topic of VET research in England, and the UK in general, including the critical link between economic performance and skill formation (Prais, 1981; Raggatt, 1988), but also quality issues. Ryan (2001, p. 137) brings into focus, looking at apprenticeships in particular, the "absence of process regulation" in the English case due to a "competence-based" approach to skill certification. He concludes that "(…) what matters in principle for NVQ certification is demonstrated competence in the performance of work tasks, and that alone. Educational attainments should indeed form part of that assessment if they are needed for competence, but are otherwise to be discarded as superfluous (…)". Therefore, it may be stated that in England the traditional neglect of formal work-based learning has even been exacerbated by CBT and modularization.

GERMANY'S EUROPEAN STARTING POSITION: SPECIFIC PROBLEMS DERIVING FROM AN APPRENTICESHIP-BASED VET SYSTEM

Germany is a country with a strong focus on educational principles and process regulation, including in VET, due to particular historical developments and a specific cultural and pedagogical pattern which supports an esteem for practical learning (Deissinger, 2004). Since the apprenticeship system (dual system) is the strongest stream in post-compulsory secondary education in Germany, its institutionalization and didactical systematization and standardization are typical of the German learning culture in VET (Harris & Deissinger, 2003). In this system, with

its 350 recognized training occupations, the commitment and interest of chambers (as crucial employer organisations), trade unions and companies are essential and are considered as prerequisites for keeping it going. A specific pedagogical component exists in the compulsory subjects provided through school attendance in the part-time vocational school, which stands both for theoretical vocational learning as well as general education during the apprenticeship. Ryan puts this in contrast with the British approach to VET: "A striking difference from Germany is the absence of minimum training periods, such as a three-year programme for bakers. Similarly, apprentices need not take part-time technical education." (Ryan, 2001, p. 136). This compulsory post-secondary apprenticeship system in Germany is law-based, not only through the education legislation of the federal states, but also – with respect to company-based training – through a national workplace training law, the Vocational Training Act (VTA), which can be characterized by two features (Deissinger, 1996):

- It places vocational training in the hands of firms and chambers and thus emphasizes the principle of self-government. The VTA takes account of the traditional features of guild apprenticeship while at the same time submitting in-company training to homogeneous, supervisable and examinable standards. The "competent authorities" function as monitoring agencies for in-company training and organize and certify exams during and at the end of an apprenticeship.
- Although it only covers company-based training, the VTA contains stipulations which confirm and refer to the existence of the second "learning venue", the part-time vocational schools. The legal framework is based on the discrete legislative functions of states and the federal level under the German Constitution. Against this background, vocational training is linked up both with the law on schools and the law on labor.

With the political idea in mind of having to transfer the EQF philosophy, at least formally, to a national semantic level, the specific German tradition and use of "Kompetenz" appears "holistic" rather than "functional", and therefore is more related to the French or Dutch understanding of competence (Westerhuis, 2011). For Germany, this poses the challenge of establishing a "competence matrix" featuring vertical differentiation in reference levels and horizontal differentiation with respect to various competence dimensions across traditionally separated spheres within the education system without ignoring the specific quality of its established pathways into employment. Leaning towards the EQF definition of knowledge, skills, and competences as the relevant dimensions of "competence" in general, the German framework (DQR) has now devised four competence dimensions (technical competence, methodical competence, social competence, personal competence). This classification clearly has its roots in the concept of *Berufliche Handlungskompetenz* (vocational action competence). However, other qualifications (certificates) also have to be included within the drafted DQR matrix. This means that qualifications

(which are normally strongly input-steered as they are based on time, curricula, examination modes etc.) have to be translated into notions of competence in line with the levels of the DQR.

In Germany, the term "competence" is mainly used in combination with vocational initial training in the dual system. *Berufliche Handlungskompetenz* hereby stands for the objective that apprentices should attain the capacity for self-regulation and problem-solving in a broad context of occupational tasks, for which they are trained in a systematic way both in the company and in school, with the latter providing general education and underpinning vocational knowledge (Kultusministerkonferenz, 2007). The drafted DQR quite clearly arrives at a typical notion of competence which underlies this philosophy of VET in the dual system of apprenticeship training in Germany. This understanding of competence has always been linked to inputs rather than outcomes, because occupational competence as a result of training "embodies all that is associated with an occupational identity" (Winterton, 2009, p. 686). Beyond technical issues, there is no doubt that the process of establishing a consensus-based DQR ultimately requires a common understanding and a common will of stakeholders to materialize this understanding of competence in the various fields of education and training, but also to tackle the "construction sites" of the German VET system. This means that structural tasks directly affecting the DQR are just one element on the "European pathway" which needs to be taken. Germany is also facing the issue of legal, administrative and political consequences arising from the competence concept and its national realization.

The strong focus on initial training in the dual system has constantly provoked criticism within the national VET debate, quite in contrast with the above-mentioned international reputation of this model of skill formation. Against the background of missing links between various forms and sub-systems of VET, the federal government in 2005 realized a revision of the VTA referring to the following intentions (BMBF, 2005):

- the inclusion of vocational preparation schemes within the scope of regulation of the law and with it the implementation of an appropriate system of qualification modules;
- the transferability of credits obtained in school-based VET via by-laws of the federal states;
- a more intense internationalization of VET by providing opportunities for apprentices to undergo part of their vocational training abroad; and
- an ongoing modernization of examinations by establishing the "extended" final examination.

It is obvious that modernization within the dual system currently mainly takes place on the curricular level. It has materialized in the creation or revision of training schemes within the system of "skilled training occupations" which now even include tentative features of modularization. However, there is a general conviction in the

research community that the system has to become even more flexible with respect to the "transition system" (Euler & Severing, 2006; Baethge, Solga & Wieck, 2007). On the other hand, interest groups, such as trade unions and chambers, are eager to underline their belief in the efficiency of the dual system as the "silver bullet" when it comes to integration in skilled employment.

As an instrument for "internal modernization", the new VTA passed in 2005 contains comparatively innovative stipulations which concern the relationship between apprenticeship training in a recognized occupation and full-time VET courses leading to vocational qualifications (Lorenz, Ebert & Krüger, 2005):

- The federal states can now determine which courses in full-time vocational schools or in comparable institutions shall lead to a partial accreditation in a subsequent apprenticeship. Applications for accreditation have to be submitted individually to the appropriate chambers (as the "competent bodies").
- Learners graduating from a full-time course leading to a vocational qualification shall get the permission to undergo a final examination in a recognized occupation before the regional chamber if the occupational profile proves to be equivalent. This regulation also includes so-called "school occupations" outside the scope of the VTA or the Craft Regulation Act.

Therefore, on paper at least, there is a situation in Germany where formal preconditions exist through which a tentative approach towards more harmonization in the VET system could be undertaken. However, the situation of full-time VET in Germany shows that, in an "apprenticeship country", alternative pathways leading to vocational qualifications are hard to establish as more or less equivalent – which, as we have seen, is a major conceptual idea underlying the EQF and its national siblings.

FULL-TIME VET IN GERMANY: SERVING TWO MASTERS

German school-leavers not going to university normally undertake apprenticeships in the dual system. In the past decades, the dual system has been faced with challenges associated with assimilating East Germany and with the critical training market situation that emerged in the 1990s. One result has been the so-called "transition system" (Krewerth & Ulrich, 2006; Neß, 2007), which has established itself as a "catch-basin" for disadvantaged young people, most of them weaker learners or migrants. Special training programs and vocational preparation schemes offered in full-time VET are now counted as what may be called an ancillary system to the dual system.

Alternative pathways and opportunities for young people outside the dual system bear the weakness of being too far away from real working life. This is even the case for workplace-related learning arrangements, such as practice firms in the so-called "vocational colleges" (*Berufskollegs*). This type of vocational school is an example of VET outside the dual system and illustrates the problems inherent in full-time

VET in Germany. Normally the students are aged between 16 and 18, and they have to hold a medium-level school-leaving qualification. The function of vocational colleges is to provide young people with an "assistant qualification", and the attainment of an entry qualification for universities of applied sciences (*Fachhochschulen*). Basically, these schools offer hybrid qualifications – which in fact correspond with one of the basic ideas of the framework concept, i.e. improving progression from VET to higher education.

While the official function of this type of school is supposed to be a combination of training and educational progression, empirical findings (Deissinger & Ruf, 2006; Deissinger, 2007) show that

- the occupational qualification is generally not valued as useful or attractive – a result which is supported by the fact that most students report their intention to take up an apprenticeship after completion of the *Berufskolleg*;
- the parking function of this kind of school seems to be very strong in the first year of the course, while students in their second year have a clearer understanding of their goals and motivations – which predominantly means taking up an apprenticeship after completion, or progression to higher education;
- the *Berufskolleg* seems to function as a bridge between school education and the dual system and therefore cannot be regarded as a real substitute or alternative in relation to the apprenticeship system.

This specific type of school now provides the entrance qualification for the *Fachhochschulen* as the regular qualification that can be obtained after two to three years. Under certain conditions, according to the Baden-Württemberg education law, an assistant qualification can be obtained, which means that the "hybridity" is now less important than in the past. On the other hand, it cannot be asserted that links to the dual system would compensate for this, let alone in the sense of a reliable system of "accreditation of prior learning", while the most important motivation for students seems to be the improvement of their position in the training market for a subsequent apprenticeship (e.g. banking or insurance) due to the insight that a college-based course fails to offer portable labor-market relevant occupational qualifications (Deissinger & Ruf, 2006, pp. 168f.).

Although it is still too early to assess the consequences of the new stipulations of the (revised) VTA, potentially they could help to establish bridges between separated sub-systems and hence comply with some of the EQF premises. However, there is no doubt that their practical relevance is dependent on the value companies and chambers place on full-time VET in general and also on the political will of governments to arrange what in Anglo-Saxon countries is called "recognition" or "accreditation" of prior learning (including formal and informal learning). It is obvious that while the dual system still has no substantial links with higher education, vocational full-time schools can indeed partly build these bridges, but – in contrast to Austria (Aff, 2006) – they have to fulfill more or less ambivalent functions in relation to the labor market.

CONCLUSION: WHERE IS THE GERMAN QUALIFICATIONS FRAMEWORK LIKELY TO LEAD US?

Against this background "European construction sites" for Germany remain, although they have to be solved primarily from a national point of view, i.e. in the German case, with a clear focus on the so-called "transition system" and the specific problems of full-time VET:

- Links between different streams within the VET architecture still seem non-existent and they are normally highly dependent on federal state or regional regulations, especially when it comes to vocational preparation and integration measures.
- Differentiation within VET is weak in terms of skill levels and duration, although, with a view to disadvantaged young people training in the dual system, for pedagogical reasons, this should not be addressed exclusively to the stronger learners.
- Links between non-formal and informal learning and formal VET are virtually non-existent. It is interesting that even in the French education system concepts have been implemented which correspond to the premises of the EQF (Ott & Deissinger, 2010).
- Full-time VET remains detached from the dual system and may be seen as the clearly weaker sub-system when it comes to portable qualifications relevant for employment.

The first step "into Europe" for the German VET system could be to re-assess and re-develop its system of links and accreditation mechanisms, not only with respect to full-time VET. Such a move would not necessarily require it to copy the English system but would reflect the acknowledgement of one of the crucial premises underlying the EQF, i.e. the appeal to "build bridges" between sub-systems, pathways, forms of learning and institutions in the VET system.

In the German political and scientific debate, national agencies such as the Federal Institute for Vocational Education and Training (BiBB) "welcome the development of a European Qualifications Framework in principle", as the Deputy President of this national agency has phrased it (Weiss, 2007), stating that attainability of any level of qualifications should become possible via the "vocational pathway". On the other hand, initial training is still seen as fundamental in this process. This does not mean that there is a serious ambition to question the vocational principle with its holistic notion of "full" and "fundamental" qualifications depicted in the term *Berufliche Handlungskompetenz*, or the strong regulatory context in which the dual system operates. While the French and English VET policies – regardless of their specific national problems as "low status" VET countries – appear to be much more pragmatic, the German debate can be characterized as considerably protective and conservative, with the trade unions and the craft sector as the major defenders of the traditional institutional arrangements in the VET system (e.g. Drexel, 2005). A first

major mental shift could be to acknowledge that the German VET architecture no longer is as clearly dominated by the dual system as it was in the past.

In January 2012, the relevant stakeholders in Germany (federal states, the federal ministry of education and science, social partners), who are represented in the Working Group dealing with the German Qualifications Framework, agreed on a draft which proposes a preliminary clarification of levels and qualifications (Esser, 2012). According to this resolution, normal (three- and three-and-a-half-year) dual-system qualifications will be defined on level 4, occupational qualifications from shorter courses on level 3, and the master craftsman (quite astonishing) will be set at level 6 (which corresponds with a bachelor degree). It seems even more remarkable that there has been no agreement on the equivalence of general school qualifications and vocational qualifications so far – with the weird result that the former ones have been, for the time being at least, excluded from the proposal. This shows that the DQR will remain a construction site for some time to come. It is also evident from this current stage of the debate that dealing with the framework concept remains focused on input factors, such as course duration or curricular distinctiveness, but is also strongly associated with stakeholder interests and perceived quality differences between courses. All this underlines the statement by Winch, who concludes that the "changing of a VET system, just like the changing of an education system more generally, is dependent upon and also has ramifications throughout society and politics. It cannot be a simple matter of a technical recipe to aid economic growth, but touches on the heart of what any society is about." (Winch, 1998, p. 377).

REFERENCES

Aff, J. (2006). Berufliche Bildung in Vollzeitschulen – konjunkturabhängige Hebamme des dualen Systems oder eigenständige bildungspolitische Option? In M. Eckert, & A. Zöller (Eds.) *Der europäische Berufsbildungsraum – Beiträge der Berufsbildungsforschung.* Bielefeld: Bertelsmann, 125–138.

Baethge, M., Solga, H., & Wieck, M. (2007). *Berufsbildung im Umbruch. Signale eines überfälligen Aufbruchs*. Berlin: Friedrich-Ebert-Stiftung.

Brockmann, M., Clarke, L., & Winch, C. (2010). The Distinct Nature of Work-based VET in England: a reflection of employer interests? In F. Rauner, & E. Smith (Eds.) *Rediscovering Apprenticeship*. Dordrecht: Springer, 91–102.

Bundesministerium für Bildung und Forschung, BMBF (2005). *Die Reform der beruflichen Bildung - Berufsbildungsgesetz 2005*. Bonn: BMBF.

Bynner, J. (2011). Youth Transitions and Apprenticeships: a broader view of skill. In T. Dolphin, & T. Lanning (Eds.) *Rethinking Apprenticeships*. London: IPPR, 17–28.

Clarke, L., & Winch, C. (2006). Vocational Education: conceptual differences between Britain and Germany. In J. J. Beichel, & K. Fees (Eds.) *Bildung oder outcome? Leitideen der standardisierten Schule im Diskurs*. Herbolzheim: Centaurus, 75–90.

Deissinger, T. (1996). Germany's Vocational Training Act: Its Function as an Instrument of Quality Control within a Tradition-based Vocational Training System. *Oxford Review of Education, 22*(3), 317–336.

Deissinger, T. (2004). Apprenticeship Cultures – a comparative view. In S. Roodhouse, & D. Hemsworth (Eds*.) Apprenticeship: An Historical Re-invention for a Post Industrial World*. Bolton: University Vocational Awards Council, 43–58.

Deissinger, T. (2007). „Making Schools Practical": Practice firms and their function in the full-time vocational school system in Germany. *Education and Training, 49*(5), 364–379.

Deissinger, T. (2009). Der Deutsche Qualifikationsrahmen – Chance zur Lösung nationaler Problemlagen. *Berufsbildung in Wissenschaft und Praxis*, *38*(6), 40–43.

Deissinger, T., & Greuling, O. (1994). Die englische Berufsbildungspolitik der achtziger Jahre im Zeichen der Krise eines „Ausbildungssystems": Historische Hintergründe und aktuelle Problemlagen. *Zeitschrift für Berufs- und Wirtschaftspädagogik, 90*, 127–146.

Deissinger, T., & Ruf, M. (2006). Übungsfirmen am Kaufmännischen Berufskolleg in Baden-Württemberg. Praxisorientierte vollzeitschulische Berufsausbildung zwischen Anspruch und Wirklichkeit. Paderborn: Eusl.

Deissinger, T., Smith, E., & Pickersgill, R. (2006). Models of Full-time and Part-time Vocational Training for School-leavers: A comparison between Germany and Australia. *International Journal of Training Research*, *4*(1), 30–50.

Drexel, I. (2005). *Das Duale System und Europa. Ein Gutachten im Auftrag von VER.DI und IG-Metall*. Bonn.

Dunkel, T., & Jones, S. (2006). Lissabon – Kopenhagen – Maastricht: Europäisierung nationaler Berufsbildung. In U. Clement, I. Le Mouillour, & M. Walter (Eds.) *Standardisierung und Zertifizierung beruflicher Qualifikationen in Europa*. Bielefeld: Bertelsmann, 40–60.

Esser, F. H. (2012). Die Umsetzung des Deutschen Qualifikationsrahmens. Hintergrund, Sachstand und anstehende Aufgaben. *Berufsbildung in Wissenschaft und Praxis*, *41*(3), 47–51.

Euler, D., & Severing, E. (2006). *Flexible Ausbildungswege in der Berufsbildung*. Nürnberg.

Fuller, A., & Unwin, L. (2011). The Content of Apprenticeships. In T. Dolphin, & T. Lanning (Eds.) *Rethinking Apprenticeships.* London: IPPR, 29–39.

Greinert, W.-D. (1988). Marktmodell - Schulmodell - duales System. Grundtypen formalisierter Berufsbildung. *Die berufsbildende Schule*, *40*(3), 145–156.

Harris, R., & Deissinger, T. (2003). Learning Cultures for Apprenticeships: a comparison of Germany and Australia. In J. Searle, I. Yashin-Shaw, & D. Roebuck (Eds.) *Enriching Learning Cultures. Proceedings of the 11th Annual International Conference on Post-compulsory Education and Training, Volume Two*. Brisbane: Australian Academic Press, 23–33.

Harris, R. (2001). Training Reform in Australia – Implications of a Shift from a Supply to a Demand-driven VET System. In T. Deissinger (Ed.) *Berufliche Bildung zwischen nationaler Tradition und globaler Entwicklung. Beiträge zur vergleichenden Berufsbildungsforschung*. Baden-Baden: Nomos, 231–254.

Hogarth, T., Gambin, L., & Hasluck, C. (2012). Apprenticeships in England: what next? *Journal of Vocational Education and Training*, *64*(1), 41–55.

Jessup, G. (1991) *Outcomes: NVQs and the Emerging Model of Education and Training*: London: Falmer Press.

Keating, J. (2008). *Qualifications Systems and National Qualifications Frameworks*. Melbourne: Monash University.

Krewerth, A., & Ulrich, J. G. (2006). Wege und Schleifen zwischen dem Verlassen der Schule und dem Eintritt in die Berufsausbildung. In V. Eberhard, A., Krewerth, & J. G. Ulrich (Eds.) *Mangelware Lehrstelle. Zur aktuellen Lage der Ausbildungsplatzbewerber in Deutschland.* Bielefeld: Bertelsmann, 69–82.

Kultusministerkonferenz (2007). *Handreichungen für die Erarbeitung von Rahmenlehrplänen der Kultusministerkonferenz für den berufsbezogenen Unterricht in der Berufsschule und ihre Abstimmung mit den Ausbildungsordnungen des Bundes für anerkannte Ausbildungsberufe.* Bonn: KMK.

Lorenz, K., Ebert, F., & Krüger, M. (2005). Das neue Berufsbildungsgesetz – Chancen und Grenzen für die berufsbildenden Schulen in Deutschland. *Wirtschaft und Erziehung*, *57*(5), 167–174.

Misko, J. (1999). *Competency-based Training*. Leabrook: NCVER.

Morgan, A. (1997). National Vocational Qualifications in a Business Studies Degree. *Journal of Vocational Education and Training, 49*(2), 181–195.

Neß, H. (2007). *Generation abgeschoben. Warteschleifen und Endlosschleifen zwischen Bildung und Beschäftigung. Daten und Argumente zum Übergangssystem*. Bielefeld: Bertelsmann.

Ott, M., & Deissinger, T. (2010). Frankreichs Berufsbildung im Spiegel der europäischen Berufsbildungspolitik: Eine komparative Analyse unter besonderer Berücksichtigung von Anpassungsproblemen und Anpassungsnotwendigkeiten. *Zeitschrift für Berufs- und Wirtschaftspädagogik*, *106*(4), 491–516.

Prais, S. J. (1981). Vocational Qualifications of the Labour Force in Britain and Germany. *National Institute Economic Review*, 98 (November 1981), 47–59.

Raggatt, P. (1988). Quality Control in the Dual System of West Germany. *Oxford Review of Education*, *14*(2), 163–186.

Ryan, P. (2001). Apprenticeship in Britain – Tradition and Innovation. In T. Deissinger (Ed*.) Berufliche Bildung zwischen nationaler Tradition und globaler Entwicklung*. Baden-Baden: Nomos, 133–157.

Unwin, L. (1999). Reforming the Work-based Route: Problems and Potential for Change. In A. Hodgson, & K. Spours (Eds.) *Dearing and Beyond: 14–19 Qualifications, Frameworks and Systems*. London: Routledge, 75–87.

Weiss, R. (2007). Permeability: much remains to be done. *Berufsbildung in Wissenschaft und Politik Special Edition 2007*, 14–15 (http://www.bibb.de/de/29669.htm).

Westerhuis, A. (2011). The Meaning of Competence. In M. Brockmann, L. Clarke, & C. Winch (Eds.) *Knowledge, Skills and Competence in the European Labour Market. What's in a vocational qualification?* London: Routledge, 68–84.

Winch, C., & Hyland, T. (2007). *A Guide to Vocational Education and Training.* London: Continuum International.

Winch, C. (1998). Two Rival Conceptions of Vocational Education: Adam Smith and Friedrich List. *Oxford Review of Education, 24*, 365–378.

Winterton, J. (2009). Competence across Europe: highest common factor or lowest common denominator? *Journal of European Industrial Training*, *33*(8/9), 681–700.

Wolf, A. (1998). Competence-Based Assessment. Does it shift the demarcation lines? In W.J. Nijhof, & J.N. Streumer (Eds.) *Key Qualifications in Work and Education.* London: Kluwer, 207–219.

Young, M. (2003). National Qualifications Frameworks as a Global Phenomenon: a comparative perspective. *Journal of Education and Work*, *16*(3), 223–237.

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