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Title **How does didactic knowledge develop? Experiences from a design project**

Author **Peter F. E. Sloane**
University of Paderborn
Germany

Uwe Krakau
Vocational College for Technology and Design of the City of Gelsenkirchen
Germany

Abstract We, the authors of the paper, have jointly conducted several design-based research (DBR) projects. The subject of this paper is a project lasting approximately 18 months, which dealt with the introduction of a new curriculum in a vocational college. We were involved in different roles: one as a representative of the research community and the other as a representative of the vocational college and thus of practice. In the project, different interests were considered: The research division wanted to generate knowledge while the practitioners were interested in implementing a curriculum and developing new forms of learning and teaching. It is not that we could always assign each of these two perspectives to exactly one of us, even though we were officially researchers and practitioners. We have always approached each other in our DBR projects.

Both perspectives have been incorporated into the paper: One author is concerned with the genesis of knowledge – how

knowledge is created in DBR projects, a partly methodological approach. The other author attempts to find theoretical points of reference and reassurances about the project work. This leads to very practical considerations.

The project did not commence with an exactly defined problem; we began with broad concerns that had to be distilled into specific goals over the course of the project.

We had to conduct dialogical planning in our different roles and responsibilities. After each work phase and workshop, we reviewed and made a record of what had happened and how, the condition of the group and what it should work on in the next practical phase. This was supplemented with classroom visits and one-on-one discussions with various project participants. The information derived from these evaluations was subsequently used in the planning of the next cycle. Therefore, in the next cycle, the same project was not conducted, but a revised project was developed, which continued from where the previous cycle had ended. Thus, the problem definition continued evolving. In this paper, we have tried to concisely present how the work progressed in phases and cycles and roughly described the thought process and evaluations that shaped this project. Perceived this way, this paper serves two different interests. First, it shows how a problem definition was developed and further sharpened and what concrete result was obtained in the process. This is indicated by the subtitle. Second, it explains how knowledge is created and defines the scope and specificity of this knowledge.

In many passages, the text refers to special features of German VET and VET research. In order to ensure that readers who are not so familiar with these issues can understand the background, we have introduced grey boxes containing background information. Readers who do not need this information and want to follow the argumentation in a target-aimed way have the opportunity to skip these text passages.

Keywords

Implementation of a curriculum
Knowledge production in design processes
Cooperation in design-projects
Design projects in vocational colleges
Didactics as applied theory

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How does didactic knowledge develop? Experiences from a design project

Peter F. E. Sloane / Uwe Krakau

1.0 Where does knowledge come from? A few introductory remarks

How does knowledge that teachers need occur, especially in practice? One thought is that they learn it through practice. Another is that knowledge is obtained through research. Both ideas are not wrong. However, the more precise question is as follows: How can we know what the right knowledge is? In research, results are important for fostering the teachers' abilities. We have to inquire how results of good research are applied in practice.

A straightforward answer is that research groups develop theories, which are subsequently transferred into practice. The outcome of this transfer depends on the ability of practitioners to adopt these theories successfully. To do so, they need to understand and transfer them correctly to their respective work contexts. Consequently, a transfer problem exists.

The transfer of knowledge of a linguistic product from an academic context to practitioners results in a separation between the production of theory and its application. Therefore, it is important to place greater focus on the adopters of these theories. It is not sufficient to merely offer theories. Theories provide reflection opportunities for practice, but are only of consequence if they provide explanations that can help enhance the relevant practices (see Zabeck, 1988).

A significant contribution is the DBR approach.[1] Joint work between researchers and practitioners aims to promote dialogue which, among other things, considers theoretical and practical perspectives, academic input, and practical experience. This fosters the creation of application-oriented knowledge and leads to improvements in both areas. Therefore, didactic theory, as an evidence basis, is only created as a consequence of dialogue in which available theory is related to practical questions, also enabling new knowledge to become apparent. It is a contextual process where practitioners and researchers jointly apply theoretical knowledge to scenarios and thus modify the existing theory.

[1] See the anthology by Euler and Sloane (2014).

Theories are not directly applicable as 'working' instructions, but act as an interpretive basis to document and structure social reality. They are a means of understanding and a foundation for planning, imple-

menting, and reviewing interventions in social reality. This dialog between researchers and practitioners promotes both theory and practice and facilitates the understanding of practices as a real-life setting.

DBR projects are based on the cooperation between researchers and practitioners. Even though both parties have different interests, an exchange takes place. Practitioners are interested in finding concrete solutions to problems while researchers strive for generalizable knowledge. According to Dieter Euler (2014a+b), the development of design principles is a product of design research. This fosters didactical knowledge of rules.

Knowledge creation logically can take place in two ways: First, it may take place through practical experience which is subsequently generalised in theory or, second, it may be formulated by researchers and later adapted in practice. It is essential to establish that knowledge of teaching and learning processes, including organisational and institutional integration, is created through a common work process.

However, in our experience, there is a third way: DBR projects are characterised by the cooperation between practitioners and researchers. This leads to joint development work, that is, the division of roles between the two actors often switches. Researchers become developers and vice versa. Ultimately, the transfer is not, strictly speaking, a transfer from science to practice or vice versa. Rather, it is a co-production of scientists and researchers. Didactic knowledge is then an interpretation of theories in terms of facts that is shared by both partners. It is created in dialogue. Consequently, we assume that didactic knowledge is created through dialogue between researchers and practitioners.

This paper showcases this approach through a case study on curriculum implementation. Therefore, we will discuss the context of an implementation programme and a design-based approach. We want to outline that design development is often embedded in complex programmes and that this fact creates some special requirements (Section 2). We will illustrate these specifications in a case study and show how we generated knowledge in this particular project (Section 3), what kind of knowledge was concretely developed in this process (Section 4). We will subsequently conduct a critical reflection of the methodological foundations (Section 5). Our aim is to concretely address theoretical as well as practical aspects of the genesis of didactic knowledge.

Finally, two levels of argumentation can be located:

- On a methodological level, the aim is to work out how knowledge emerges in design projects. We assume a dialogue process between researcher and practitioner, as a result of which knowledge emerges in the sense of a hermeneutic process (modus applicandi). Sections 2 and 5 address this as a matter of priority.

- At the level of concrete project implementation, we want to show who was involved in the project. We describe in great detail the cyclical structure of the project, the schools involved and the objectives of the project from a practical point of view (Section 3). We then document the project results in a very concentrated and summarised way, showing which knowledge documentation has resulted with regard to the concrete project work and which more conceptual-theoretical knowledge has been gained (Section 4).

Background Information 1: Model Experiment Research and Design-Based Research
The project design is an approach from so-called model experiment research (insert sources). These are innovation projects carried out by educational organisations and scientifically accompanied by research groups. Here there are numerous experiences and possibilities for connection to the Anglo-Saxon discourse on design-based research. The German contributions refer to the fact that researchers and practitioners belong to very different systems. This results in different interests, norms and also hierarchical integration of the participants in such a joint project. This basic position is reflected in the article in the sense that, in Section 4 in particular, reference is made to the concrete results of the work, which are of great importance for the participating schools. In addition, generalised results are documented that refer to the further development of theoretical knowledge. Finally, a special feature of the approach pursued by the authors is that in model experiments, and thus also in the case study, extensive text production is carried out by all participants. These texts are the basis for the evaluation and acquisition of knowledge. (cf. Sloane 2006)

2.0 Design Research in Complex Research Programmes

2.1 Implementation programmes and design research

DBR assumes the development of solutions to problems in cooperative projects involving practitioners and researchers. This creates the impression that there are precisely defined problems for which a solution is developed, which, in turn, is generalised by research, possibly by comparing the respective results with other comparable projects.

Regardless of the question of the comparability of such singular problem-solving processes, in practical work, one rarely deals with such precisely defined projects. In fact, cooperation agreements are often made between research groups and organisations in practice, which usually involve the processing of a rather open and more comprehensive task. This agreement defines a common working context. In this context, the respective partners have different interests. The practice

partner wants to solve a specific problem, and the scientific partner is interested in gaining new knowledge or confirming existing knowledge.

Background Information 2: New VET Curricula in Germany
The case study discussed in this paper is about the implementation of a new curriculum. This curriculum regulates the training of office management clerks. It is a new profession that replaces old professions in Germany. The curriculum is not based on specialist science, but is structured via fields of activity (learning fields). A central objective of the curriculum is to promote independent and self-organised learning and working. This places special demands on the teaching staff. From a research perspective, these demands can only be met if the teachers are prepared by a personnel development concept. This concept must also relate to the concrete teaching work of the teachers in the new training occupation (see also Background Information 3). After a lengthy reorganisation procedure, the new training occupation of 'Clerk for Office Management (OMC)', which combines three former office-based occupations, gained official recognition in 2014. As part of a cooperation project, the new curriculum was systematically implemented in two vocational schools in Dortmund (Germany): the Karl-Schiller-Berufskolleg and the Konrad-Klepping-Berufskolleg. The Department of Business and Human Resource Education of Paderborn University was responsible for the execution of the project.

The practice partners were two vocational colleges with which the research partners already had several years of cooperation experience. The primary concern of the two heads of these vocational colleges was to prepare the teaching staff for the new curriculum and ensure that the teaching changes accordingly. This problem was discussed between the practitioners (Berufskolleg) and researchers, and an 18-month qualification programme was proposed by the research side, which aimed to develop materials (course plan, teaching series, learning aids, etc.) with which the future curriculum can be planned and implemented. Furthermore, it should also promote the competence development of the teachers.

Certainly, there is a common programme that was agreed upon and broken down into sub-projects in the course of the collaborative work. These sub-projects are, in turn, the actual design projects. Therefore, it is useful to distinguish between a macro structure and a micro structure in concrete design projects: The macro structure refers to the framework concept of a design study, while the micro structure refers to concrete development work in sub-projects. The work becomes more complex when individual projects are interlinked. Programmes are ultimately a network of such projects that are interrelated.

2.2 Cyclical structure

Design studies are collaborations between practitioners and researchers. Practical problems are the starting point. Through collaborative work, solutions for these problems are developed and generalised. Simultaneously, the theoretical understanding is improved. This two-fold function is typical. It is based on an iterative process – theoretical insights and practical successes are developed cyclically. Various authors have illustrated this in cycle models, of which we will only take up three here (Reeves 2006, McKenney and Reeves 2012, and Euler 2014a, respectively):

<table>
<tr><th>General view on the cycles</th><th>Reeves 2006</th><th>McKenney and Reeves 2012</th><th>Euler 2014a</th></tr>
<tr><td rowspan="2">Specifying and analysing problems</td><td rowspan="2">Analysis of practical problems by researchers and practitioners</td><td rowspan="2">Analyses

Exploration</td><td>Defining the problem</td></tr>
<tr><td>Reviewing literature and practical experience</td></tr>
<tr><td rowspan="2">Design and implementation</td><td>Solutions through existing design principles</td><td rowspan="2">Design

Construction</td><td>Developing and fine-tuning design</td></tr>
<tr><td>Iterative testing in practice</td><td>Testing and formative evaluation of design</td></tr>
<tr><td rowspan="2">Evaluation and reflection of the product and process of design development</td><td rowspan="2">Reflections to develop design principles</td><td rowspan="2">Evaluation

Reflection</td><td>Generating design principles</td></tr>
<tr><td>Summative evaluation of design</td></tr>
</table>

Table 1: DBR Cycles – an overview

There are three central phases in a cycle:

- Specifying and analysing problems – Researchers analyse a practical problem together along with practitioners; practical experience and theoretical expertise are used to develop initial ideas for a possible solution.
- Design and implementation – A first draft of a design is developed and implemented.
- Evaluation of and reflection on the design and its implementation – The experience gained in the development and implementation stage is recorded.

Here, one must distinguish between simple DBR processes and complex DBR programmes. A rather simple cycle refers to a clearly defined project, for example, the development of self-learning materials for a specific course. This is a clearly defined and delimited problem, and it is easy to see how design development, design testing, and evaluation are intertwined.

However, the study presented here is a complex implementation programme with the following specifics:

- The problem is initially formulated in general terms. It will be refined over the course of the work cycles.
- The individual cycles do not repeat a development process with regard to a given objective. Rather, the objective changes.
- There is a hierarchy of problems that are processed. The statement often made in the literature is that a practical problem being worked on must be modified to the effect that a complex problem structure is being worked on. This structure is characterised by several problems, some of which only become visible from a bird's-eye view of the project.

3.0 The Design Project: Implementing a New Curriculum

3.1 Problem

Framework

The design project aimed at jointly preparing teachers of both vocational schools to teach the OMC courses. Furthermore, it sought to design, implement, and formatively evaluate lessons based in a learning field curriculum (see below the excursus on this curriculum-type). In other words, the implementation of the new curriculum was an opportunity to develop and improve the competencies of the teaching staff. In short, the project was also a human resource development endeavour.

Background Information 3: The Learning Field Concept in Germany
Within the framework of the dual system of vocational education and training (VET) in Germany, the foundation of learning field-oriented curricula, and thus, the learning field concept for the vocational school part of training was laid in 1996 (see KMK, 1996/1997; currently 2011). The implementation of such curricula in the respective schools takes the form of 'school-based curriculum work' (Sloane, 2003) at a macro level related to the training programme in the form of annual didactic planning (see Sloane, 2001, 195 – the term 'annual didactic planning' is not explicitly mentioned here; see exemplarily Buschfeld, 2002, 31/34-38; Arbeitsgruppe SELUBA-NRW, 2004; Buschfeld, 2013; Wilbers, 2015) and on a teaching micro level in the form of learning situations as learning objects and complex teaching/learning arrangements (see exemplarily Kremer & Sloane, 2001, 179–183; Buschfeld, 2003, 2 ff.). According to the idea of learning fields, which arise in the process of curriculum development as a didactic transformation of practical occupational fields of action, these are concretised within the school as learning situations. Pupils receive learning situations as case- or task-related learning objects. The learning and teaching

process subsequently aims at developing a solution for a problem. Following the character of a situation, learning fields are, therefore, guidelines for casuistic learning processes. As such, they follow the idea of action-oriented learning.

The successful problem solving by the learners and, in the end, the concrete solution to the problem – often identified as a characteristic of a learning situation, namely as a result of action (cf. Buschfeld, 2003, 3) – is used for the finalisation of the learning process (and subsequently often also represents the end point of the intended teaching/learning arrangement simultaneously).

(cf. Krakau, 2018, 1)

Apart from implementing the new curriculum, the project aimed to improve teachers' didactic skills, and therefore, functioned as further teacher training. Thus, the researchers performed the roles of researchers and instructors. To meet these objectives, alternating phases of workshops and internal school work were scheduled. The training programme, as a competency-based approach, served as a basis for internal working processes in schools, which, according to Paderborn researchers, was structured as a discursive-responsive process with mutually influencing stages of work (cf. Sloane, 2007b).

Teachers should, on the basis of the created course concept (cf. diagram 1)

- undertake curriculum analysis,
- develop an annual didactic plan,
- model and sequence learning situations (learning objects),
- develop complex teaching and learning arrangements, and
- implement an evaluation process in order to establish individual skills development of the learners as well as the success of the measures carried out.

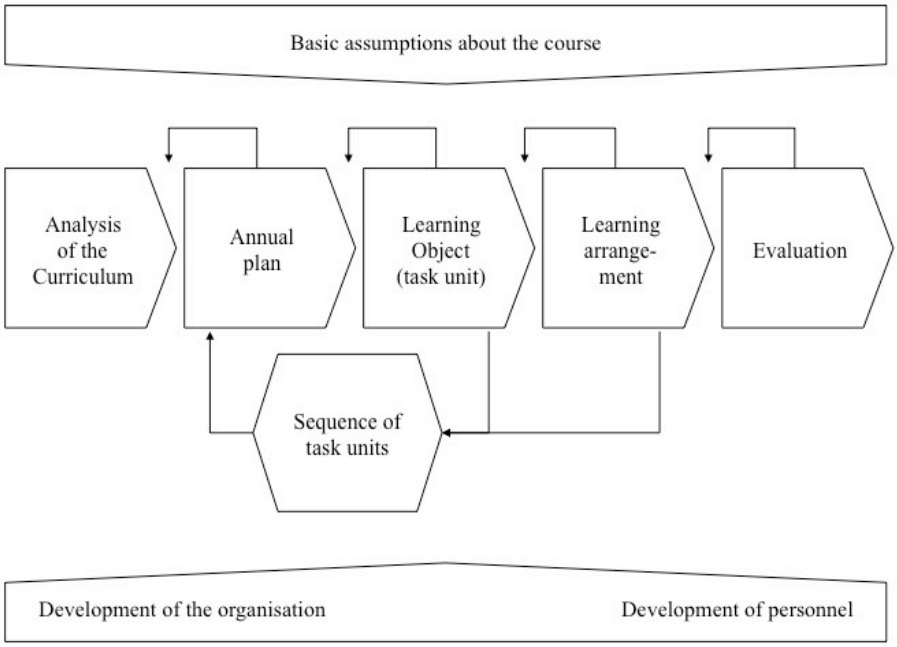

Figure 1: Coursework as a process model (cf. Sloane, 2013, 2)

3.2 The DBR process

The school focused on developing expertise suitable for the new courses which focused on[2]:

- Human resource development, specifically competence development of the teaching staff
- Conceptual implementation of the course, curriculum analysis, and annual didactic planning
- Development of learning situations
- Development of complex teaching/learning arrangements

[2] This focus includes a reduction of the complete process model described in Figure 1 to four main aspects.

Phase	Specifying and analysing problems	Design and implementation	Evaluation and reflection	Outcome/ knowledge
Conceptual background (level 0)	Development of a model of educational planning (Educational Management)	Theoretical Input – state of the art Workshop with work orders Implementation in the field	Individual interviews Feedback rounds Analysis of the developed products	Mission statement for educational programme Concept of self-organised learning and working

Didactic and annual planning (level 1)	Carry out curricular analysis and prepare didactic annual planning	Theoretical Input Workshop with progress report and work orders (development of focus groups) Implementation in the field	Round table Group feedback rounds Analysis of the developed tasks Class visits	Didactic annual plan Sequencing of teaching units Model of self-regulated learning and working Documentation procedures
Learning Situation (level 2)	Development of business process-oriented problem situations for teaching	Theoretical Input Workshop with progress report and work orders Implementation in the field	Round table Group feedback rounds Analysis of the developed tasks Class visits	Structural model of individual learning situations taking into account considerations of self-regulated learning and working Sequencing of learning situations Connection of professional principles and logics of action Documentation procedures
Learning Arrangements (level 3)	Development of complex learning arrangements	Theoretical Input Workshop with progress report and work orders Implementation in the field	Round table Group feedback rounds Analysis of the developed tasks Class visits Expert hearing on the developed materials	Didactic planning model First notes on diagnostics Contextualisation and decontextualization as design principles Fading out as sequencing principle Shifting teaching activities to the learners Documentation procedures

Table 2: Internal process

The researchers in the project were interested in analysing the development of work structures at the educational level of the course and, most importantly, generating qualitative data on possible application

theories (e.g. annual didactic planning), ultimately reconstructing the situation of didactic knowledge.

As already mentioned, there exists a hierarchic problem structure in the programme. Four central work cycles were established. In each work cycle, the phases identified in Section 1 (see Table 1 above) can be localised following Euler, Reeves, and McKenney. This leads to the following internal structure of the programme:

3.3 Work organisation and procedure

Both authors[3] were official moderators of the training programmes. They formed the cooperation between academia and practice: school practice (Krakau) and academic research (Sloane). To represent the organisation of work, a cascade model with three levels of action was developed:

- A coordination group comprising members from the school management from both vocational schools and the research group was established whose task was to coordinate and develop concepts (working level I).
- There was a focus group comprising members of the core teams of the corresponding training courses of the two vocational colleges, the two moderators, and the two school administrations. They were responsible for the development of learning material and the coordination of its design, respectively (working level II).
- More than 50 teachers from both VET schools participated in the training (Working level III).

The project lasted 18 months, during which eight workshops were held.[4] Every workshop was conceptually developed by the research team and organised with the coordination team. Every workshop was linked to a working phase of the implementation group (working level III) which, in turn, was moderated by the focus group (working level II).

The workshops were developed, evaluated and further developed by the research team in consultation with the school management (working level I and II). They were conducted jointly by the authors. As a rule, there were impulse lectures and concrete work tasks related to the development process. In the workshops, work assignments for further development and practical implementation were then agreed with the teachers (working level III). The results of the working phases in the field are documented and discussed in the subsequent workshops. The following figure shows the procedure:

[3] Uwe Krakau, at that time, was head of the vocational school department at the Karl-Schiller-Berufskolleg and the direct interlocutor of Peter. F. E. Sloane.

[4] Finally, we think it is important to note that there are some deviations in this project compared to a classic DBR programme. Strictly speaking, a development cycle was run during the 18 months. However, this was related to the production of different parts of an entire chain, which is shown in Figure 1. From this point of view, the sequence of workshops does have a cyclical course, but in each cycle a changed product is considered. These products are related to each other.

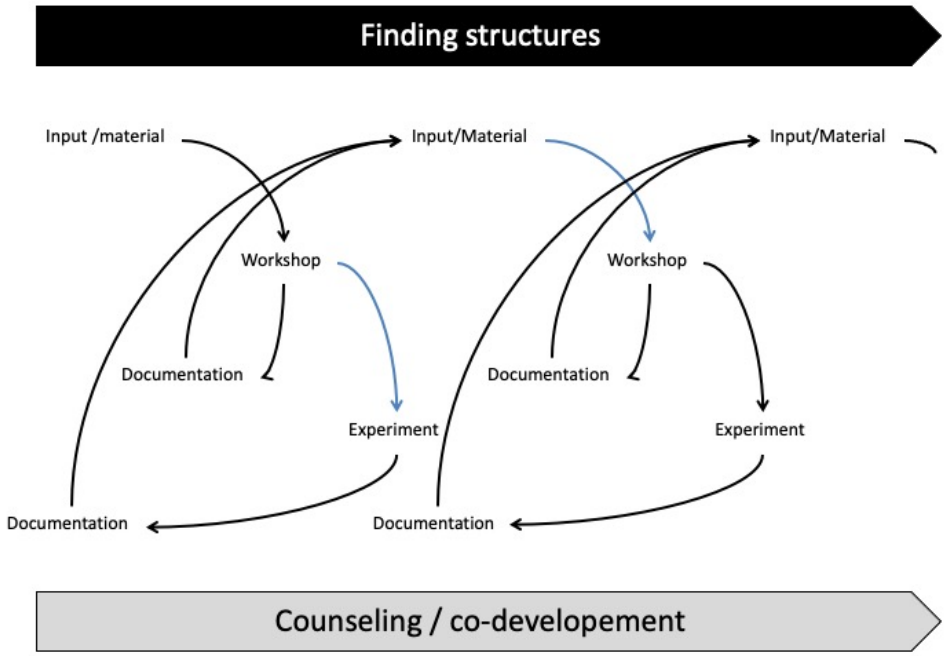

Figure 2: Cyclic Development of the Workshops

Structures were worked out over time, for example with regard to planning models for work in the schools or concepts for self-organised learning. This work in the workshops as well as the independent work in the field is comprehensively documented in the form of texts. These texts are the basis for a comprehensive evaluation by the research group.

3.4 Documentation of results in the work process and their evaluation

The evaluation of the types of texts produced in the work process is based on methods of phenomenological sociology (cf. Soeffner 2004a+b; Sloane 2017a). The following primary texts can be distinguished:

- Protocols
- Excerpts from textbooks, reference books
- Collected data
- Notes from files, etc.

These documents are produced (stage 1) and evaluated according to various aspects (stage 2) and finally compiled into an overall text. Strictly speaking, text production is the central process of knowledge acquisition. This is often done by the research group, which primarily establishes references to the state of research. In principle, however, the text evaluation can also be carried out by a joint project group con-

sisting of practitioners and researchers. However, the concrete composition and respective expertise has a decisive influence on the evaluation. Figure 3 shows the text types. In this figure, for the sake of completeness, a research journal has also been included as a documentation method. This is an individual documentation of a researcher who compiles experiences, results of partial work, text modules and much more. This instrument is based on the portfolio technique.

Text evaluation is a hermeneutic procedure in which a communicative validation (source) is carried out. Two hermeneutical approaches can be distinguished (Cf. Terhart 1981, pp. 773; Sloane 2017b):

- Hermeneutical field 1: communication and cooperation in the arena between researchers and practitioners.
- Hermeneutical field 2: communication and cooperation in the scientific community between researchers.

This will be discussed in Section 5.

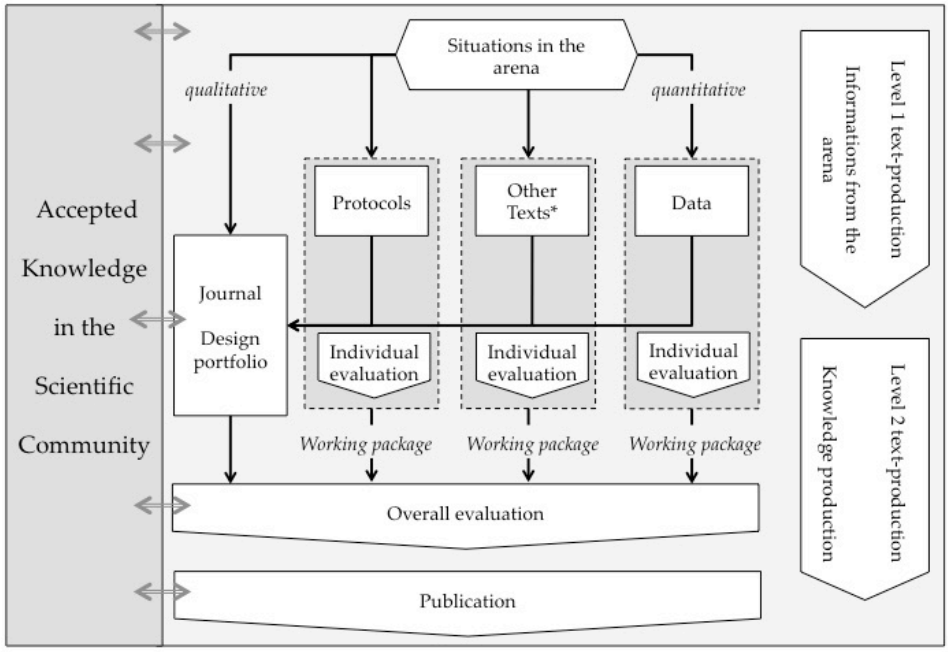

Figure 3: Text generating in design-based research projects (cf. Sloane 2017b)

4.0 Results of the Design Study

Two ultimately different types of knowledge can be distinguished: Practical knowledge and conceptual-theoretical knowledge:

Practical knowledge is documented in the texts developed in the project and is reflected in overviews, procedures, planning models, learning concepts, etc. These are concrete specifications from the perspective of practice. From the point of view of practice, these are concrete guidelines for the design of everyday work. Their relevance results from their contribution to solving school problems.

Conceptual-theoretical knowledge arises from the generalisation and interpretation of practical knowledge, i.e. it is based on practical knowledge. It is validated in a process of interpretation, the framework of validity is the theoretical discourse.

We will refrain from a comprehensive documentation of practical knowledge in the following. We have done such documentation elsewhere (Cf. Krakau and Sloane 2018). Instead, we will give an overview of the generated practical knowledge (paragraph 4.1), which is needed in the two schools for complex action processes. It is important for us to describe these different levels of action. Already the introduction of such a hierarchical planning on different levels is very innovative from the point of view of school practice.

The aim of the design project from the research point of view is to generate cross-case knowledge. It is therefore about generalising knowledge. One could also speak of de-contextualising case-based knowledge. We will demonstrate this in two further paragraphs in this chapter: In paragraph 4.2 we will use the example of sequencing learning situations to show how a theoretical reflection of a practice case takes place. In paragraph 4.3 we will summarize some hints on generated design principles and in paragraph 4.4 we will discuss further problems.

4.1 Practical knowledge: prototype development

For the benefit of the vocational schools, not only the changes in teachers' competencies, but also the process of production of course materials were extensively documented. This documentation is intended to serve as a guiding resource for future collaborations but also in the materials produced, which are intended to have a guiding and coordinating function for future collaborations. According to the process model on which the project is based (see 51 above), the following product-oriented results can be recorded.

The practical application-oriented results of the project, including the competence development of the teachers, are central to the materials developed and are likely to have a leading and coordinating function in future collaborations. According to the underlying process model (see Figure 1 above), several product-oriented results have been obtained:

(1) Conceptualising courses

(2) Didactic annual planning (level 1 planning)

(3) Learning situations (scenarios) (level 2 planning)

(4) Didactic arrangements (level 3 planning)

Ad (1) – conceptualising courses

The basic conceptual position of the training course – a clarification of central concepts of the course and an analysis of the means of order – was developed in the first workshop.

The central concepts of the theoretical learning basis and the action-theoretical framework were formulated. The analysis of the syllabus and supplementary subject-related literature, which were included by the academic chair, led (nominally for the time being) to the use of a constructive approach. The central characteristics collectively established were as follows:

- Learning is an individual, subjective process. When dealing with a learning object, for example a learning situation, the learner develops his competencies in a process that is, maximally, self-regulated.
- Teachers, therefore, offer the learning objects (learning situations) as problems that are ideally independently solved by the individual.
- This requires learners to possess the necessary competencies to comprehend the learning object.
- If learners do not have the required learning competencies, or the learning competencies needed are extremely demanding, the teacher is compelled to assist the learning process. However, the goal is for the learners to gradually learn independently.
- Learning is therefore a specific form of action. The following principle applies: Every kind of learning is an action, but not every kind of action is learning.[5]

The essential features of the educational programme were as follows:

- It is assumed that students practiced independent learning in teams. To facilitate this, complex learning and teaching agreements were developed. These agreements were based on work-related tasks, whereby different types of companies were explicitly referred to (multi-perspectivity).
- The course of education comprehensively aims at the promotion of technical, human, and social competence as well as methodological, language, and textual competence. Finally, the promotion of value development is also explicitly addressed.

[5] In vocational and economic pedagogical theory and practice 'action' is primarily differentiated in the concept of complete action through partial actions ('anticipation', 'execution', and 'control') (cf. e.g. Stratenwerth, 1988, 130 f.). Work-related action can then be perceived as exteriorization and learning action as interiorization of structural-identical actions and are conducted by subjects in relation to the matter (cf. Czycholl, 1996, 121 f.; Sloane, 1999; Dilger & Sloane, 2007a, 82).

Ad (2) – Annual didactic plan (Level 1 planning)

Background Information 4: Internal Structure of Learning Field Curricula
A learning field curriculum usually specifies five to ten learning fields. These are professional trial positions, with references to possible activities, tasks, and problems. In addition, technical contents are listed according to relevant theories, models, and concepts that are applied into the learning area as an activity field. In the figure below, this was reduced to two ideal-typical learning fields.

It is now the teacher's responsibility to process these learning fields and develop learning situations. The learning fields represent concrete learning objects, which are conceived as situational tasks. *These* tasks must be sequentially listed in the annual planning. The objective of these tasks – learning situations – is to equip each learner with the competency to tackle these situations successfully. The tasks are arranged in a sequence based on the complexity of the activities and contents.

This is an elaborate task, which is expected to grow more complex as new concerns and needs arise. Thus, general education subjects, such as German, foreign language, social studies, and religion, must be integrated into this planning.

The top planning level – level 1 – comprises the annual didactic plan, which is further divided into two stages: learning situations (level 2) and, teaching and learning arrangements (level 3). This level is a starting point for the overall plan, but simultaneously, it changes during the more detailed planning stages and occurs as a result of the responsive planning approach (see once more Figure 1: *process model* above).

Ad (3) – Learning situations (Level 2 planning)

The implications of developing learning situations are twofold. First, individual learning situations need to be designed in a concrete manner. Second, learning situations need to be linked systematically so that the sequence effectively represents a school curriculum.

According to the research and development work from Paderborn University, a learning scenario is considered to be a situational occupation-relevant task characterised by the following features:

- The situation is formulated as a narrative, making it an open work-related question.
- The description of the situation asks learners to perform an action. Such action can be structured as a complete action, as information processing. An action process is a necessary part of the learning situation.
- This action process ends with a desired action outcome.
- The action itself takes place in an action space structured by materials, role plays, tasks, etc.
- However, the situations do not have a reference to action, which can be systematised via the characteristics of the action space, action outcome, and action process. In addition, content, and thus, subject- or domain-specific components, must be considered.
- Furthermore, self-regulated learning is an imminent part of a learning situation, which is reflected in the fact that corresponding learning competencies such as meaningful reading,

information search, and elaboration strategies are addressed. These were identified as learning and working techniques.

<table>
<tr><td colspan="2">Background Information 5: Structure of Learning Situations</td></tr>
<tr><td colspan="2">A learning situation is based on a narrative scenario (story) which focuses on a special task of the learning field. The following example from the case study shows how learning situations are structured and documented:

It specifies five to ten learning fields. These are professional trial positions, with references to possible activities, tasks, and problems. In addition, technical contents are listed according to relevant theories, models, and concepts that are applied into the learning area as an activity field. In the figure below, this was reduced to two ideal-typical learning fields.

It is now the teacher's responsibility to process these learning fields and develop learning situations. The learning fields represent concrete learning objects, which are conceived as situational tasks. These tasks must be sequentially listed in the annual planning. The objective of these tasks – learning situations – is to equip each learner with the competency to tackle these situations successfully. The tasks are arranged in a sequence based on the complexity of the activities and contents.

This is an elaborate task, which is expected to grow more complex as new concerns and needs arise. Thus, general education subjects, such as German, foreign language, social studies, and religion, must be integrated into this planning.</td></tr>
<tr><td>Learning field No. 1 (40 hours):

Learning situation No. 2 (10 hours):</td><td>Presenting the company and discussion of the individual's role in the company.

Who are we? We showcase our company.</td></tr>
<tr><td>Opening Scenario

In three weeks, there will be an apprenticeship fair in Dortmund. As our company wants to hire more trainees next year we are asked to present the company and its training programme at this fair.

The personal officer, Miss Meyer, not only offers information about the job profile and relevant department, but also introduces the company as a whole.</td><td>Action result (AR)

• Overview of the company
• Showcase of the company with appropriate visualization (e.g. poster or PowerPoint)</td></tr>
<tr><td>Central Competencies

(1) Collecting information from different sources

(2) Capability of presenting

(3) Constructive critique: ability to criticise and to accept criticism

(4) Presenting the company emphasising
• the aims of the company</td><td>Specifying the Content (C)

• Product factors of the company
• Aims of the company
• Service spectrum of company
• Performance and outcome of the company</td></tr>
</table>

• the service spectrum of the company (5) Using information and communication techniques	Note: This is a general (theoretical) view on the company. The scenario is an example of this theoretical approaches.
Working and learning techniques / self-regulation (WuL) • Elaborating information and presenting them • Methods of reflection in social groups	
Link to other learning situations (task units) • Learning field 3: Developing an enterprise model • Learning field 3: The role of a trainee. Being member and representative of an enterprise.	
Teaching material, sources ---	
Organisational information The unit should be an investigation of the trainees in their enterprise.	

Ad (4) –Teaching/Learning Arrangements (Level 3 planning)

Level 3 is concerned with concrete implementation in the form of teaching series. This is the second step towards the development of learning situations. The learning situation is often equated with the teaching/learning arrangement. However, we believe that this must be explicitly separated. A learning situation is a learning object – strictly speaking, an open scenario with references to professional contents and an implicit reference to a problem. As shown above, it is always also a challenge to identify problems.

In our opinion, such learning situations should be implemented in teaching/learning arrangements. Such an arrangement deals with further didactic questions, of which only two are explicitly addressed here due to constraints of scope and space:

(1) Teaching/learning arrangements incorporate learning scenarios into a broader normative context.

(2) The contextualisation and decontextualization of knowledge, as well as learning and working strategies, are addressed in teaching/learning strategies.

We will discuss these aspects in the following paragraph.

4.2 Example of the Knowledge Production: Learning sequences

Questions of sequencing on a macro-structural level (= structuring, for example, of a course of education or learning field via learning situations) are directly linked to a micro-structural sequencing (= structuring, for example, of a learning situation via a teaching/learning arrangement) (cf. Eigenmann 1975, 224 on terminology; cf. similarly also Sievers 1984, 323; also Achtenhagen et al. 1992, 105).

The individual learning situations, which are connected and built upon each other, should become increasingly complex. This increase in complexity occurs with regard to (i) the situation, for example, through increasing diversity of information, (ii) the content, for example, as a deepening of technical-methodological concepts, or (iii) the action, for example, through an increased degree of self-regulation (cf. Sievers 1984, 342 ff.; see also Reetz 1984, 173 and Achtenhagen et al. 1992, 105).

In our opinion, the concrete implementation of the work subsequently concentrated on two central questions:

(1) How can the logical order in a sequence of learning scenarios be appropriately incorporated and subsequently coordinated between all associated learning fields and subjects?

(2) How can a transfer of responsibility for the management of learning be gradually shifted from teachers to students?

The normative context of coursework

Due to their concrete orientation, learning situations are often in danger of making the work process an educational goal. If, for example, a problem situation is addressed in the commercial sector, such as the obtaining of delivery offers and the selection of the said offer, there is at least implicitly the problem that the proper handling of the task is defined as the central goal of the instruction. However, the actual fact is that this learning situation has a special function within the training year, which is specifically related to the question of which skills are to be fostered and developed overall. Perceived in this light, the question arises as to the contribution of the learning situation and the incorporated problem for the competence development of the learners. This can be considered at the level of annual planning (levels 1 and 2), but must also be examined at the level of lesson planning and implementation, specifically considering what to do with the learning situation as a whole and how to ensure competency development beyond the student's handling of the same. Subsequently, this also includes the question of diagnosing competencies.

Contextualisation and Decontextualization

This makes decontextualization a central issue at level 3, and if this is not considered, there is a risk that teaching with open learning situations will become chaotic learning. In our view, this is also one of the reasons why teachers repeatedly want to resort to subject structures, as these at least give them the guarantee that they can fix the activities of the pupils to binding structures.

In fact, however, the task of generalising the situational knowledge that learners acquire in learning situations is very demanding. This is

ultimately the problem of how to transfer a case-based solution into a general solution principle. In other words, how does casuistic knowledge become systematic knowledge? This also involves the decontextualization of learning and working strategies.[6]

[6] It should be pointed out that not only professional competencies are contextualised and decontextualized, but all partial competencies of professional actions are considered here.

In this sense, the micro- and macro-sequencing, mentioned above, are neither intended as a delimitation of both levels (cf. Eigenmann 1975, 224; also Klauser 1998, 276, 282) nor is it meaningful in the context of competence development. At the interface of macro- and micro-sequencing, for example, there is a 'phasing' proposed by one of the authors of this paper with 'phases for the development of systematic knowledge ... which are based on the respective learning situations' and which are to be supplemented by 'subject mediating phases' if necessary (Sloane 2007, 491 f.). Such a decontextualization can take place within a learning situation, but can also be anchored organisationally 'between' learning situations (cf. Dilger/Sloane 2007c, 45 f.).

In the orientation towards the complete action in a didactically differentiated form, a sequence of concrete (= situation relevant to practice), abstract (= decontextualization), and re-concrete (= deepening and/or transfer) takes place micro-sequentially (cf. Dörner 1982, 138 f.; see also Sievers 1984, 343 ff.). A decontextualization is subsequently found within the learning situation.

Here, two variants can certainly be imagined: a deductive and an inductive approach. This was tested in a previous study (see Krakau 2011, 9-12). In this sense, Figure 6 shows the prototypical micro sequence of the learning situations of a course of education as a construction model with inductive or deductive access.

The concrete instructional implementation of decontextualization can be conducted in terms of instructional methodology by creating, for example, blackboards, tables, mind or concept maps, wiki entries, presentations after (or even before) the situation, information sheets or handouts, etc. This phase should be executed either by individual learners or the learning group, with least intervention from teacher(s).

Recontextualisation can be conducted methodically, for example, by addressing actual or potential applications in training companies or in real-life contexts, trends, and scenarios in the sector or by working on in-depth tasks. In this phase, teacher interventions should be as restrained as possible and learners should act as independently as possible.

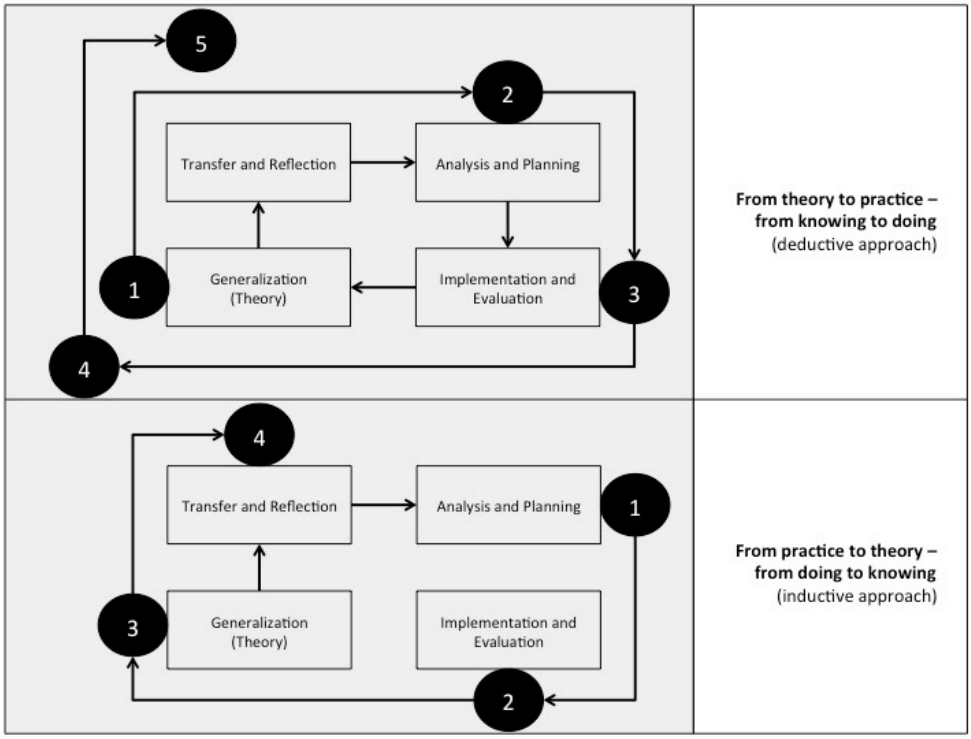

Figure 4: Inductive and deductive micro-sequences (extended to Krakau, 2011, 12)

A perennial problem with this type of classroom research is ultimately the unwillingness to talk about failures. Ultimately, supposed successes are presented and offered in the form of best practice knowledge. This certainly has an orienting function. But sharing information about failures is also important because it can reveal connections as well as expose limitations of the respective approaches. Nevertheless, this is probably more of a concern for researchers, who seek to clearly declare the limits of the knowledge procured. In doing so, the focus shifts from practical application to findings, that is, the increase of knowledge in research.

4.3 Conceptual Knowledge: Design principles

As initially mentioned, rule-related knowledge is acquired in the form of design principles in design projects. This idea is probably also inherent in the approach preferred here; individual design studies fully differentiate structural knowledge. Nevertheless, it remains partly unclear which semantic structure design principles have. This may be understood as quasi-nomological statements following the concept of 'From simple to difficult!' However, we believe that the overall context is more complex. First, structural descriptions are always required. The present individual case study offers a series of such descriptions:

- of learning situations
- for self-regulated learning
- for didactic teaching, etc.

At the workshops, based on these structural descriptions, work projects were agreed upon which contributed to the implementation of these structures. These structures were negotiated in a dialogue between the participating teachers and the steering group and the following design principles were chosen:

- *Fading-out*: One-man sequence principle must be used for organizing teaching in an annual plan. Teachers have to hand over control to learners. In other words: Learners have to take over the regulation of the learning process.
- *Complementarity of content and action process*: In the construction of learning situations, teachers must combine thematic sequences and action-logical sequences.
- *Forerunner and follower in sequences*: The question is not only what kind of content (knowledge) is necessary for specific actions. Teachers must also consider what kind of preparation in forerunning learning situations need to be taken into account.
- *Story telling*: Teachers must embed problems in implicit narrative stories to give students at least the chance to analyse these stories to find out what they have to do. This is important for the learners' development of regulation strategies.
- *Contextualisation and Decontextualization*: Story telling is a process of contextualisation of knowledge. In the first step, the teacher presents a learning situation containing a single hidden problem which students are expected to identify and solve. The second step is de-contextualising this individual experience and developing a general understanding of this problem solving.
- *Structural equality of learning and working:* Self-regulated learning and self-regulated working are both integrated in a concept of complete action.

4.4 Some remarks on further problems

In the summative evaluation of the programme, problems became visible. Some of these became apparent during the work we did together. Many of the issues resulted from the fact that beneath the steering group a huge group of more than 50 teachers participated in the dissemination of the results. Disagreements and, to some extent, the negative attitude against the programme affected the collaborative work. Thus, we were not always able to transfer these problems into the DBR cycles.

Some of the problems occurred due to external influences. A major setback occurred due to the publication of teaching manuals introduced by schoolbook publishers. A part of the teacher group turned

away from the developed material and the basic concepts of the programme and decided to teach on the basis of the new textbooks.

The following critical list, however, points out relevant issues that should be addressed in future projects. These include:

(i) Teachers find it difficult to think in the form of annual plans and overarching sequences aimed at developing learners' skills. Individually, and in teams, teachers frequently concentrated on specific lessons, disregarding the overall course. This leads to segmentation of teaching units.

(ii) An initial attempt was made to develop appropriate materials for the target audience of the course. An initial attempt was made to develop target audience-oriented course material by anticipating situations students might encounter at their job. However, the teaching material had been developed for larger industrial corporations, while students were predominantly employed in small and medium-sized companies. The examples and, to some extent, the technical questions were often inapplicable to their daily lives. Therefore, while developing or adapting course material or a learning environment, the use of appropriate learning scenarios must be given explicit importance. The publication of textbooks disrupted this work and led to teachers adapting their work to them.

(iii) Many teachers found it difficult to disregard socialised subject-specific structural models. Without resuming the previous discussion on the knowledge of subject-matter of commercial apprenticeships, it can be noted that they did not involve subject-specific or academic structures. Instead, the structural knowledge was often based on traditional didactic and textbook-based concepts of economic thought and actions. The relevance of such knowledge to students' lives has yet to be empirically tested.

(iv) This attitude especially became apparent in topics concerning technical writing. Word processing and ergonomic writing etc., which were present in the preceding courses, have been removed from the curriculum. There was considerable support to keep them.

(v) The project structure, including the direct involvement of the management, has already been described above. The school administrations of both colleges also participated almost entirely. Their presence highlighted the importance of the project and promoted its implementation throughout all phases. This was especially true for the new course approaches, for example, the introduction and the development of new course designs or the introduction of more specific evaluation procedures. On the other hand, the school administrations' engagement led to various obstacles, such as conflicts arising from disagreements.

(vi) Closely associated with this was a ‘catalyst function’ of such school development projects for the human resource department. The above-mentioned structural models and the conflicting demands of learning fields, and thus competence-oriented education plans, caused intense discussions between the school’s middle-management and staff working at different levels.

(vii) An intensive and multi-phase reflection of the curricular actions produced proved to be both helpful and necessary for the competence development of teachers to enable the analysis and development of learning field-based curricula. Initially, the external research participants played a limited role, but increasingly became part of a discursive internal planning process.

(viii) An explicit goal of the project was the implementation of evaluation procedures for observing and describing student’s competence development. The school administrations were interested in using different instruments – the Paderborn learning tableau, tiered tasks, and journal/portfolio work as well as a teachers' logbook (see Dilger & Sloane, 2007b for more details) were discussed. The course teams were far more reluctant, which was evident in the project sequence where the Paderborn learning tableau was used with difficulty.

5.0 Reflections on the Methodology

5.1 On the quality of individual case studies

The basis of this project was cooperation between a research institution and educational institutions. A description of the project is given in Section 2 (see also Krakau & Sloane 2018). At this point, it is important to identify the project as a concrete example of a collaboration between academia and practice and to outline key methodological assumptions and prerequisites (cf. in summary Sloane, 2005; 2006; 2014; 2017a/b).

Researchers and practitioners participate in such collaborations with differing interests and goals, and thus the demands and criteria for success also vary. Academia is interested in methodological justification while practice, in this instance the schools involved, aims to solve a practical problem and generate applicable concepts. To identify this as a possible research goal is at first glance very plausible and follows a certain 'proposal logic' as is typical for so-called third-party funded projects. Simultaneously, however, often this task-orientation is indirectly linked to research and cognitive interests. In turn, this is linked to specific ideas as to what is regarded as ‘good research’ or a ‘good theory’. This sequence of ideas quickly evolves into a debate on methodological principles, but this topic will not be pursued further in this paper. Discussions on fundamental research versus applied research are likely to continue (see Sloane, 2017b as an example). In many

cases, the former is equated to quantitative-empirical research, and should generate universally valid cross-situational theories. In principle, these theories should be independent of uncertainties, which is shown by the fact that a replication of the research design confirms the research results.

Evidence-based work is generated if actions are taken based on theories. However, there exists a lack of replicability. This is not the suitable place to discuss this in depth. In various social science disciplines, there is now talk of a replication crisis. Thus, Gilbert, King, Pettigrew, & Wilson (2016, 1037) state in reference to Carey 2015: 'Depending on the criterion used, only 36 to 47% of the original studies were successfully replicated, which led many to conclude that there is a 'replication crisis' in psychological science'. In some disciplines, there is therefore an increasing demand for a stronger focus on design-oriented research like, for example, in business management (cf. Küting, Kußmaul, Bieg, Weber, & Waschbusch, 2013; Giersberg, 2017 as an example).

Especially in teaching/learning, researchers question this approach. This may be due to the fact that methodological design has not yet been fully developed and therefore requires further pursuit. However, things appear different, if one is of the opinion that for example:

- Pedagogical processes are overly complicated. Quantitative methods perform a structural reduction of this complexity, which contributes to the replication problem and produces somewhat inapplicable results, since their validity, in comparison to other received studies, no longer enables stochastic attributions.
- The theoretical model of quantitative research is an insufficient basis for the development of real pedagogical processes.
- The reception and adoption of theory to concrete situations must be a part of the construction of didactic theory.

In our opinion, this results in the following methodological determinations:

(1) Didactic theory does not exclusively arise from empirical-quantitative analyses (Deductive-Nomological Model) but also through their integration into the cognitive process of a reflexive subject (model of understanding).

(2) This means, among other things, that didactic theory is not merely a product of research for practice, but is developed through a dialogue between them.

(3) What precisely is understood by didactic theory is debatable: Empirical researchers define it as the understanding of technology in the sense of technological transformation developed from general theories. We doubt this. We regard didactic theory as design-oriented research resulting from the aforementioned dialogue.

(4) This makes the distinction between basic and applied research in didactics obsolete, as we believe that it is a matter of formulating design-relevant knowledge.

The dialogue between research and practice is developed in individual case studies. The methodological stance used here (cf. in summary Sloane, 2017a) has prominent advocates in vocational and business education. In our opinion, it can be justified by the demand for casuistic individual case studies formulated by Jürgen Zabeck (1988) – as a criticism of empirical rational research. According to him, these should contribute to the generation of action-oriented knowledge.

In this context, individual case studies do not comprise single incidents, but are a part of larger research programmes and associations, such as pilot programmes. The present case is an 18-month individual case study, which, in turn, was part of a series of similar studies conducted by the Paderborn research group.

All studies in the series focused on addressing two issues. First, self-regulated learning in vocational education and training was examined, particularly regarding the promotion of self-regulation. Second, the concept of the theory of teaching and learning was addressed.

In the series, aspects of the two questions were differentiated, and structural models for the pedagogical work were developed. It was and still is about the differentiation of these structural models and their application to different didactic situations.

5.2 Improving theory through the application of theory: the subtilitas applicandi in didactic fieldwork

The project was structured as a series of workshops and practical stages. Theoretical input was provided in the workshops. If the implementation of these inputs was contested, a work process was initiated, which was continued by teams in the practical phases (see Section 4 on practical implementation). The preparation of the workshops was moderated by a steering committee consisting of representatives from academia and practice.

In DBR approaches, there exists a twofold function of maturing interventions and fostering theoretical insight or understanding. This is the result of communication between practitioners and researchers. At the beginning of DBR projects, the line separating these two actors is visible. But these borders gradually disappear. Gabi Reinmann (2014) explains in one of her contributions that design is not only the object of research, but is research. She suggests that one problem of design as research is that the existing knowledge about these kinds of processes do not fit into the schemes of research because designing seems to have more of a relationship with art than with science. This is possible.

But, at the end, it is a question of the accepted research paradigm. As Gabi Reinmann also mentions in her 2014 contribution: DBR is a completely different way of research than traditional empirical research.

Thinking of this in a radical way leads to different perspectives on research and science.

If the border between design and research vanishes, practitioners and researchers have to be seen as one acting system. They are co-designers and co-researchers. We, the two authors of this contribution started our cooperation with clearly defined roles – one of us was a practitioner and the other a researcher. As already mentioned, during the last years of our cooperation this differentiation disappeared as we worked together, on practical problems as well as on theoretical approaches.

The result of our cooperation are contributions like this and concepts like the ones the case study tells about.

Table 6 (see above) shows not only the results of the project, but also demonstrates the two levels of work. The first level represents the school's position, whose focus lies on developing material for pedagogical work. The second level concerns itself with the application of theories and models from the individual case studies of the research group, which it aims to improve and differentiate through its application. Methodologically, this is a subtilitas applicandi.

Due to spatial constraints, the complex hermeneutic approach will not be addressed. The central idea is that texts about reality are created through its imitation (mimesis).

Ultimately, social reality is not only represented by texts. The aim is not to produce a photographic recount, but rather a narrative telling of reality. This narrative follows an inner logic which is similar to the methodological considerations discussed in scientific texts. The common discourse is reflected in text productions and receptions and leads to 'stories' being told. These textual issues are interpreted and what they have in common is that they refer to the social events and 'recount' them.

Far from being simple, here imitation is a complicated process of concept formation and use, which leads to the creation of knowledge. This is how individual studies generate texts on didactic scenarios. Through this, structural descriptions are condensed and, in turn, are related to new and mutatis mutandis alerted situations. This is the process of text production and reception.[7] The reception is also an active process of 'guided work' (cf. Sartre, 1974, 169 f.) and can be interpreted as subtilitas applicandi (Gadamer, 1972). The application of the text to a (life) situation enables the reader to understand the structures and intentions conveyed by the text. For illustrative purposes, this is presented in a very concise and pointed way. Ultimately, it is about the hermeneutic process of understanding. Gadamer has extended this process, which is often seen in a dichotomy of interpretation and understanding, to include the aspect of application in reference to Rombach. This is relevant for us while drawing on theoretical considerations of reception (cf. Sloane, 1992), insofar as we assume that texts are produced and received in dialogical research. In such an approach, researchers 'feed' texts, for example, via workshops, but also via other communi-

[7] It is, therefore, a hermeneutic practice, as labelled by Soeffner (2004b, 122). In it, 'social structures' are gradually discovered (Soeffner, 2004a, 83 ff.). It is in part demanded that interpretation of the text be subject to rules (cf. Danner, 2006, 100 ff., based on Klafki, 1998).

cative settings, into joint work with practitioners. These are subsequently received and further developed. The texts can be developed both from the concrete field of practice by the researchers via surveys etc. and texts by the practitioners (statements, position papers, concepts, etc.). Finally, it is also conceivable that (field) external texts (research findings, etc.) could be included (see Sloane, 1992; 2010b; 2014; 2017a).

Here, Gadamer (1972, 291, 312 ff.) defines this as the application by a recipient who understands the text, the theory, and the structure through its application. In this context, application is interpreted as a reflection of events. Theories and texts are seen as proposed interpretations to be put into practice and are thus applied.

6.0 Conclusion

This paper aimed to contribute to the existing literature by showing how dialogical research functions. In this concept, didactic theory is a localisation of knowledge that enables application. Furthermore, we have tried to outline the phenomenological foundations (cf. in summary Sloane, 2017a) in a condensed manner. It was particularly important to us to reveal the process of the on-site work and the texts produced.

Since such a development project generates an abundance of text, it was not feasible to share all the examples. The limitation on the number of examples prevented us from showing the different development stages of the texts.

Ultimately, we aim to generate knowledge that can be used generally to guide the design of didactic processes. It is idle to question the extent to which this is hard theory and so forth. We believe that social sciences are a counterpart of natural sciences; our research mirrors this. This is design-oriented research, which contributes to existing knowledge on designing pedagogical processes with additional reasoning based on education theory.

In this respect, we believe, it justifies theories in educational science.

7.0 Appendix: *Synoptic overview of the schools involved*

The following table provides an overview of the schools participating in the project:

	Konrad-Klepping-Berufskolleg	**Karl-Schiller-Berufskolleg**
Students	approx. 2700	approx. 3200
Teachers	105	approx. 120

School profile	Vocational college for the commercial sector with courses for bank clerks, industrial clerks, office economics, legal and tax courses, and services	Vocational college for the commercial sector with courses for retail trade, office economics, marketing, services, and computer science
Course	Clerk for office management (OMC)	
Students in the courses	approx. 410	approx. 500
Teachers in the courses	25	28
Classes in the courses	5-6 each year (block teaching and part-time)	7 each year (part-time)
Teachers work level 1 (coordinating group)	School management Assistant principal	School management Head of the courses Deputy head of the courses
Teachers work level 2 (focus group)	12	12
Teachers work level 3 (implementation group)	25	28

8.0 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.

Arbeitsgruppe SELUBA-NRW (2004). Didaktische Jahresplanung. In R. Bader & M. Müller (Eds.), Unterrichtsgestaltung nach dem Lernfeldkonzept (195-220). Bielefeld: W. Bertelsmann.

Buschfeld, D. (2002). Von Bullen und Bären im Bildungsgang. In R. Bader & P. F. E. Sloane (Eds.), Bildungsmanagement im Lernfeldkonzept: Curriculare und organisatorische Gestaltung (20-39). Paderborn: Eusl.

Buschfeld, D. (2003). Draußen vom Lernfeld komm' ich her ....? Plädoyer für einen alltäglichen Umgang mit Lernsituationen. bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 4. Online: http://www.bwpat.de/ausgabe4/buschfeld_bwpat4.pdf (30.07.2018).

Buschfeld, D. (2013). Didaktische Jahresplanung – was, wozu, wie und wie viel davon für wen? Kölner Zeitschrift für Wirtschaft und Pädagogik, 28, (55), 29-54.

Carey, B. (28.08.2015). Psychology's fears confirmed: Rechecked studies don't hold up. New York Times, A1.

Czycholl, R. (1996). Handlungsorientierung in der beruflichen Bildung. In B. Bonz (Ed.), Didaktik der Berufsbildung (113-131). Stuttgart: Holland + Josenhans.

Danner, H. (2006). Methoden geisteswissenschaftlicher Pädagogik: Einführung in Hermeneutik, Phänomenologie und Dialektik (5th ed.). München, Basel: Ernst Reinhardt.

Dilger, B. & Sloane, P. F. E. (2007a). Die wirklich vollständige Handlung – Eine Betrachtung des Handlungsverständnisses in der beruflichen Bildung unter dem Fokus der Selbstregulation. In F.-W. Horst, J. Schmitter, & J. Tölle (Eds.), Wie Mosel Probleme löst. Lernarrangements wirksam gestalten (66-103). Paderborn: Eusl.

Dilger, B. & Sloane, P. F. E. (2007b). Das Wesentliche bleibt für das Auge verborgen, oder? Möglichkeiten zur Beobachtung und Beschreibung selbst regulierten Lernens. bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 13. Online: http://www.bwpat.de/ausgabe13/dilger_sloane_bwpat13.pdf (30.07.2018).

Dilger, B. & Sloane, P. F. E. (2007c). Prozess der Bildungsgangarbeit: Die didaktische Wertschöpfungskette. In B. Dilger, P. F. E. Sloane, & E. Tiemeyer (Eds.), Selbstreguliertes Lernen in Lernfeldern. Band II: Konzepte und Module zur Lehrkräfteentwicklung. Beiträge im Kontext des Modellversuchs segel-bs, NRW (27-55). Paderborn: Eusl.

Dörner, D. (1982). Lernen des Wissens- und Kompetenzerwerbs. In B. Treiber & F. E. Weinert (Eds.), Lehr-Lern-Forschung: Ein Überblick in Einzeldarstellungen (134-148). München, Wien, Baltimore: Urban & Schwarzenberg.

Eigenmann, J. (1975). Sequenzen im Curriculum: Eine Studie zum Problem der Sequenzbildung in der Curriculumentwicklung unter besonderer Berücksichtigung kognitionspsychologischer Theorie und des Lernzielansatzes. Weinheim, Basel: Beltz.

Euler, D. (2014a). Design Principles als Kristallisationspunkt für Praxisgestaltung und wissenschaftliche Erkenntnisgewinnung. In D. Euler & P. F. E. Sloane (Eds.), Design-Based Research. Beiheft 27 der Zeitschrift für Berufs- und Wirtschaftspädagogik (97-112). Stuttgart: Franz Steiner.

Euler, D. (2014b). Design-Research – a paradigm under development. In D. Euler & P. F. E. Sloane (Eds.), Design-Based Research. Beiheft 27 der Zeitschrift für Berufs- und Wirtschaftspädagogik (15-41). Stuttgart: Franz Steiner.

Euler, D. & Sloane, P. F. E. (Eds.) (2014). Design-Based Research. Beiheft 27 der Zeitschrift für Berufs- und Wirtschaftspädagogik. Stuttgart: Franz Steiner.

Gadamer, H. G. (1972). Wahrheit und Methode (3rd ed.). Tübingen: Mohr.

Giersberg, G. (03.07.2017). Wie die Realität ist und wie sie sein sollte. Der Streit zwischen normativer und empirischer Betriebswirtschaftslehre bricht abermals auf. FAZ – Frankfurter Allgemeine Zeitung, 16.

Gilbert, D. T., King, G., Pettigrew, S., & Wilson, T. D. (2016). Comment on “Estimating the reproducibility of psychological science”. Science, 351, I. 6277, 1037-1039.

Klafki, W. (1998). Die geisteswissenschaftliche Pädagogik – Leistungen, Grenzen, kritische Transformation. In W. Klafki, Erziehung – Humanität – Demokratie: Erziehungswissenschaft und Schule an der Wende zum 21. Jahrhundert. Neun Vorträge. Marburg. Online: http://archiv.ub.uni-marburg.de/sonst/1998/0003/k03.html (30.07.2018).

Klauser, F. (1998). Problem-Based-Learning – Ein curricularer und didaktisch-methodischer Ansatz zur innovativen Gestaltung der kaufmännischen Ausbildung. Zeitschrift für Erziehungswissenschaft, 1, 273-293.

KMK – Sekretariat der Ständigen Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (Ed.) (1996/1997/2011). 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. Bonn.

Krakau, U. (2011). Veränderungen in der schulischen Curriculumarbeit: Lernfelder schulisch implementieren. bwp@ Berufs- und Wirtschaftspädagogik – online, Spezial 5 – Hochschultage Berufliche Bildung 2011. Online: http://www.bwpat.de/ht2011/ft19/krakau_ft19-ht2011.pdf (30.07.2018).

Krakau, U. (2018). Vollständige Unterrichtssequenzen – Rekonstruktion der Mikrosequenz komplexer Lehr-/Lernarrangements in lernfeldstrukturierten Curricula. bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 33. Online: http://www.bwpat.de/ausgabe33/krakau_bwpat33.pdf (30.07.2018).

Krakau, U. & Sloane, P. F. E. (2018). CUI BÜMA – Ein schulübergreifendes Designprojekt der Lehrkräftequalifizierung zur Curriculumentwicklung und -implementation in einem schulübergreifenden Bildungsgang. bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 33, Online: http://www.bwpat.de/ausgabe33/krakau_sloane_bwpat33.pdf (30.07.2018).

Kremer, H.-H. & Sloane, P. F. E. (2001). Lernfelder implementieren: Zur Entwicklung und Gestaltung fächer- und lernortübergreifender Lehr-/Lernarrangements im Lernfeldkonzept. Paderborn: Eusl.

Küting, K., Kußmaul, H., Bieg, H., Weber, C.-P., & Waschbusch, G. (2013). Saarbrücker Plädoyer für eine normative theorie- und praxisbezogene Betriebswirtschaftslehre. Der Betrieb, 66, 2097-2099.

McKenney, S. & Reeves, C. T. (2012). Conducting educational design research. New York: Routledge.

MSW – Ministerium für Schule und Weiterbildung des Landes Nordrhein-Westfalen (2014). Kauffrau für Büromanagement – Kaufmann für Büromanagement. Vorläufiger Bildungsplan – Fachklassen des dualen Systems der Berufsausbildung – Fachbereich: Wirtschaft und Verwaltung. Düsseldorf.

Reetz, L. (1984). Wirtschaftsdidaktik: Eine Einführung in Theorie und Praxis wirtschaftsberuflicher Curriculumentwicklung und Unterrichtsgestaltung. Bad Heilbrunn: Klinkhardt.

Reeves, T. (2006). Design research from a technology perspective. In J. Van den Akker, K. Gravemeijer, S. McKenney, & N. Nieveen

(Eds.), Educational Design Research, 86-109, Online: https://www.fisme.science.uu.nl/publicaties/literatuur/EducationalDesignResearch.pdf (05.02.2020).

Reinmann, G. (2014). Welchen Stellenwert hat die Entwicklung im Kontext von Design Research? Wie wird Entwicklung zu einem wissenschaftlichen Akt? In D. Euler & P. F. E. Sloane (Eds.), Design-Based Research. Beiheft 27 der Zeitschrift für Berufs- und Wirtschaftspädagogik (63-78). Stuttgart: Franz Steiner.

Sartre, J.-P. (1974). Autor und Leser. In P. U. Hohendahl (Ed.), Sozialgeschichte und Wirkungsästhetik: Dokumente zur empirischen und marxistischen Rezeptionsforschung (166-185). Frankfurt a. M.: Athenäum-Fischer.

Sievers, H.-P. (1984). Lernen – Wissen – Handeln. Untersuchungen zum Problem der didaktischen Sequenzierung. Dargestellt am Wirtschaftslehre-Curriculum in der Sekundarstufe II. Frankfurt am Main: R. G. Fischer.

Sloane, P. F. E. (1992). Modellversuchsforschung: Überlegungen zu einem wirtschaftspädagogischen Forschungsansatz. Köln: Müller Botermann.

Sloane, P. F. E. (1999). Situationen gestalten: Von der Planung des Lehrens zur Ermöglichung des Lernens. Markt Schwaben: Eusl.

Sloane, P. F. E. (2001). Lernfelder als curriculare Vorgaben. In B. Bonz (Ed.): Didaktik der beruflichen Bildung (187-203). Baltmannsweiler: Schneider.

Sloane, P. F. E. (2003). Schulnahe Curriculumentwicklung. bwp@ Berufs- und Wirtschaftspädagogik – online, Ausgabe 13. Online: http://www.bwpat.de/ausgabe4/sloane_bwpat4.pdf (30.07.2018).

Sloane, P. F. E. (2005). Wissenschaftliche Begleitforschung: Zur wissenschaftlichen Arbeit in Modellversuchen. Zeitschrift für Berufs- und Wirtschaftspädagogik, 101, 321-348.

Sloane, P. F. E. (2006). Modellversuchsforschung. In F. Rauner (Ed.), Handbuch Berufsbildungsforschung (2nd ed.) (658-664). Bielefeld: W. Bertelsmann.

Sloane, P. F. E. (2007a). Bildungsgangarbeit in beruflichen Schulen – ein didaktischer Geschäftsprozess? Zeitschrift für Berufs- und Wirtschaftspädagogik, 103, 481-496.

Sloane, P. F. E. (2007b). Berufsbildungsforschung im Kontext von Modellversuchen und ihre Orientierungsleistung für die Praxis: Versuch einer Bilanzierung und Perspektiven. In R. Nickolaus & A. Zöller (Eds.): Perspektiven der Berufsbildungsforschung: Orientierungsleistungen der Forschung für die Praxis (11-60). Bielefeld: W. Bertelsmann.

Sloane, P. F. E. (2010a). Prozessbezogene Bildungsgangarbeit in der kaufmännischen Bildung – ein Designprojekt zur Sequenzierung. 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 (27-48). Stuttgart: Franz Steiner.

Sloane, P. F. E. (2010b). Berufsbildungsforschung im geisteswissenschaftlichen Paradigma. In R. Nickolaus, G. Pätzold, H. Reinisch,

& T. Tramm (Eds.), Handbuch Berufs- und Wirtschaftspädagogik (367-373). Bad Heilbrunn: Julius Klinkhardt.

Sloane, P. F. E. (2013). Prozessorientiertes Bildungsgangmanagement zur Implementation kompetenzorientierten und selbst regulierten Unterrichts in einem schulübergreifenden Bildungsgang. Unpublished Working Paper. Paderborn, Dortmund.

Sloane, P. F. E. (2014). Wissensgenese in Design-Based-Research Projekten. In D. Euler & P. F. E. Sloane (Eds.), Design-Based Research. Beiheft 27 der Zeitschrift für Berufs- und Wirtschaftspädagogik (113-139). Stuttgart: Franz Steiner.

Sloane, P. F. E (2017a). 'Where no man has gone before!' – Exploring new knowledge in design-based research projects: A treatise on phenomenology in design studies. Educational Design Research, 1, (1). Online: http://dx.doi.org/10.15460/eder.1.1.1026 (30.07.2018).

Sloane, P. F. E. (2017b). Unbekannte Praxis – Über die Schwierigkeit einiger Forscher, die Welt zu verstehen. Zeitschrift für Berufs- und Wirtschaftspädagogik, 113, 355-365.

Soeffner, H.-G. (2004a). Prämissen einer sozialwissenschaftlichen Hermeneutik. In H.-G. Soeffner (Ed.), Auslegung des Alltags – Alltag der Auslegung: Zur wissenssoziologischen Konzeption einer sozialwissenschaftlichen Hermeneutik (2nd ed.) (78-113). Frankfurt a. M.: UVK.

Soeffner, H.-G. (2004b). Hermeneutik: Zur Genese einer wissenschaftlichen Einstellung durch die Praxis der Auslegung. In H.-G. Soeffner (Ed.), Auslegung des Alltags – Alltag der Auslegung: Zur wissenssoziologischen Konzeption einer sozialwissenschaftlichen Hermeneutik (2nd ed.) (114-159). Frankfurt a. M.: UVK.

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. Beiträge zum 2. Symposium Fachdidaktik Wirtschaftswissenschaften vom 21. Mai bis 23. Mai der Universität zu Köln (123-138). Düsseldorf: Verlagsanstalt Handwerk.

Terhart, E. (1981). Intuition – Interpretation – Argumentation. Zum Problem der Geltungsbegründung von Interpretationen. Zeitschrift für Pädagogik, Heft 5/1981, 769-793.

Wilbers, K. (2015). Didaktische Jahresplanung: Aufgaben, Varianten und Entwicklungsperspektiven. In K. Wilbers (Ed.), Didaktische Jahresplanung an kaufmännischen Schulen (10-40). Berlin: epubli.

Zabeck, J. (1988). Was leistet die Handlungsforschung in der Berufs- und Wirtschaftspädagogik insbesondere im Hinblick auf die Lösung didaktischer Fragen? In M. Twardy (Ed.), Handlung und System. Beiträge zum 2. Symposium Fachdidaktik Wirtschaftswissenschaften vom 21. Mai bis 23. Mai der Universität zu Köln (79-96). Düsseldorf: Verlagsanstalt Handwerk.

Author Profile

Peter F. E. Sloane is full professor of Business and Human Resource Education at the University of Paderborn, Germany (since 2000). He is also a Research Fellow at University of Oxford, Department of Education (since 2013) and was Appointed Professor at the University of Leeds (2014-16), UK, the University of Munich, Germany, (1996-2000) and at the University of Jena, Germany (1992-1996). His research focuses on design projects, designing vocational education and training (VET) (didactic aproach in VET: cross-curricular learning, self-regulated learning, action-based learning), learning approaches in VET (Institutional background and governance of VET), teachers' professional development, human resource education, and in-company training (teaching and learning in enterprises, qualification of trainers, work-based learning, human resource management).

Uwe Krakau is headmaster of the Vocational College for Technology and Design of the City of Gelsenkirchen, Germany (since 2015). Before he was head of the vocational and professional dual training department at the Dortmund Karl-Schiller-Berufskolleg (Vocational College), Germany. As coordinator for the Ministry of Education in North Rhine-Westphalia he implemented various design projects in vocational education and training and also worked as a research fellow at the Department of Business and Human Resource Education at the University of Paderborn. His work focuses on the research and development of vocational education and training, especially on the design and implementation of innovative didactical approaches, on aspects of educational management, and on design-based research in general.

Author Details

Prof. Dr. Peter F. E. Sloane
University of Paderborn
Warburger Straße 100
33098 Paderborn
Germany
+49 5251 60-3553
lehrstuhl.sloane@campus.upb.de

Uwe Krakau
Berufskolleg für Technik und Gestaltung der Stadt Gelsenkirchen
(Vocational College for Technology and Design of the City of Gelsenkirchen)
Overwegstr. 63
45881 Gelsenkirchen
Germany
+49 209 45031-11
berufskolleg@btg-ge.de

Editor Details

Prof. Dr. Tobias Jenert
Chair of Higher education and Educational Development
University of Paderborn
Warburger Straße 100
Germany
+49 5251 60-2372
Tobias.Jenert@upb.de

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