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DANIEL PITTICH (University Siegen)

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Editors

BERND ZINN

RALF TENBERG

DANIEL PITTICH

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DANIEL PITTICH

Editorial: Sustainability-Audits with Trainees – Insights into the pilot project NAUZUBI

ABSTRACT: NAUZUBI is the acronym for a pilot project initiated by the German Federal Institute for Vocational Training (BIBB) with the title "Nachhaltigkeits-Audits mit Auszubildenden – Ein lernortkooperativer Modellversuch für eine nachhaltige Berufsausbildung" (engl.: Sustainability-Audits with Trainees – A pilot project for Sustainable Vocational Training) which is funded by the Federal Ministry For Education and Research from 2015 – 2019 within the BIBB programme "Vocational Education and Training for Sustainable Development". A consortium of two universities, five companies, three vocational schools in Hesse and North Rhine-Westphalia (NRW), the German Federation of Trade Unions and the Chamber of Industry and Commerce in NRW and participating trainees develop sustainability audits and test them in practise. The over-all objective of the pilot project is to 1) transform the participating companies into sustainable learning environments with educational training structures which offer access to sustainability topics ensuring learn effectiveness and 2) design and implement audits in the context of sustainability which are education and training related

Keywords: Sustainability, Vocational education and training for sustainable development (BBNE), Audit, vocational training

Editorial: Nachhaltigkeits-Audits mit Auszubildenden - Einblicke in den Modellversuch NAUZUBI

ZUSAMMENFASSUNG: NAUZUBI ist das Akronym für einen BMBF / BIBB-Modellversuch mit dem Titel „Nachhaltigkeits-Audits mit Auszubildenden – Ein lernortkooperativer Modellversuch für eine nachhaltige Berufsausbildung", der von 2015 – 2019 vom BMBF im BIBB-Programm „Berufsbildung für nachhaltige Entwicklung" gefördert wird. In einem Konsortium aus zwei Universitäten, fünf Betrieben, drei berufsbildenden Schulen in Hessen und Nordrhein-Westfalen sowie dem DGB und der IHK-NRW werden zentral Nachhaltigkeits-Audits mit Auszubildenden in den Betrieben entwickelt und erprobt. Übergreifendes Ziel des Modellvorhabens ist, 1) die teilnehmenden Betriebe als nachhaltige Lernorte aufzustellen, also (Ausbildungs-)Strukturen zu schaffen, die lernhaltige Zugänge auf Nachhaltigkeitsthemen gewährleisten und 2) ausbildungsbezogene Audits im Thema „Nachhaltigkeit" zu konzipieren und umzusetzen.

Schlüsselwörter: Nachhaltigkeit, Beruflicher Bildung für nachhaltige Entwicklung (BBNE), Audit, berufliche Ausbildung.

1 Starting point

In recent years, the topic sustainability has become increasingly important to various areas of daily life, society and work. It is taken into account in the context of topics like hunger, global warming, global shortage of raw materials, extinction of species, etc. and relating political and economical responses as well as administrative actions. Sustainability is particularly significant as subject of discussion regarding current and future generation's global and social responsibility. The increasing sustainability demands are obvious for companies. The focus of the companies is on general ethical claims in connection with social responsibility. The government, associations, customers and suppliers impose specific requirements. Dealing with corporate sustainability topics such as renewable raw materials, CO2 neutrality, energy management and resource efficiency, is often a balancing act between ecology and economy. The external and internal credibility of companies depends on their individual approach to sustainability. Therefore, it is not only considered as a duty (and thus it is also an expense factor) of further developments but also as a resource. Customers and markets are highly sensitised, especially in industrialised countries with their responsibility of companies or brands. Key questions concerning the educational content of sustainability arise within this complex with a partial antinomic structure. This applies both to general and vocational education and training. Due to the involved companies, vocational education and training is of crucial importance. For instance, the BIBB and BMBF[1] have initiated the pilot project programme "Vocational Education and Training for Sustainable Development", which is conducted from 2015 - 2019. At the same time, innovative companies must face the challenge of combining competitiveness and responsibility for the environment and society. This is considered as major focal point. The vocational reality or working world is understood as a critical place "where significant innovations can develop and implementations of a sustainable process of transformation can be achieved" (BIBB 2016, p. 2). The main objective is "Promoting competences for a sustainable design of the working and living environment." (BIBB 2016, p. 2) Qualified professionals are expected to enable "assessing and changing their actions towards long-term and global impacts related to the environment, society and economic developments" (BIBB 2016, p. 2). Sustainability is not only to become integrated into the pilot project series by means of concrete measures within the organisational structures of training, further education and beyond but also as an integral part of professional competence.

2 Theory and Research

The comprehensive picture of the theory and research status shows the links between sustainability and education (chapter 2.1), sustainability and vocational education and training (chapter 2.2) and the correspondence of the concepts of sustainability and professional competence (chapter 2.3).

2.1 Sustainability and Education

"Sustainability" or "Sustainable Development" have become frequently used terminology. However, it is also often used in different contexts. It is part of economic, social and political processes and has also established itself in scientific discourses (Von Hauff, M. & Kleine 2009). The origin

1 German Federal Ministry for Education and Research.

of the concept of sustainability is assumed in forestry. At an early stage, it was clear that deforestation is limited to the regeneration and regrowth cycle of the forest. (Bundestag 1995, p. 18). In the 1990s, the principle of "thinking things through" was seized in the context of the global discussion on environmental protection and the global challenges such as the climate change and it raised an increased awareness of addressing these topics appropriately in terms of complexity, scope and long-term development. Government and international programmes reflect the aspects of sustainability. "Ecological", "economical" and "social" aspects are the tree dimensions which are considered as pillars of sustainability or sustainable development (Bundestag 1998).

According to the UNESCO programme "Education for Sustainable Development" (UNCED 1992; UNESCO 2006; UNESCO 2012), in the context of sustainable education, a paradigm shift is to be expected in economy and in the professional world. This carries educational and personal implications as well. In addition to substantive issues, which mainly focus on ecological and economic aspects, sustainability requires people to feel and be responsible for the protection of the environment concerning economic viability and a fair society to make information-based and sensible decisions and to act accordingly. The focus is consistently on the acceptance of cultural diversity and the future generation (BIBB 2015). These statements suggest that sustainability has been a broad research topic since the 1990s, which is not only implemented in many disciplines but also in an interdisciplinary manner. Basic disciplines are integrated such as biology and physics, areas of application such as construction, energy and environmental technology or forestry and agriculture as well as sociological areas such as sociology and education (i. a. Glaser et al., 2006). In the pedagogical research context, the moral, normative aspect of sustainability is addressed with the aim of developing the individual and social responsibility and awareness of this topic to consider it as an issue of education (i. a. Rieß and Apel 2006).

2.2 Sustainability and Vocational Education

The previous representations of sustainability have already indicated that it is a complex, multidimensional, process-orientated, cross-functional and communication-orientated construct (Fischer 2007). Additionally, heuristic structures are usually rather identified than linear structures. They are significant in both general education and vocational education and training. However, direct references can be found in connection to the functional system of vocational education and training (i. a. Fischer 2007).

In the German overall context of sustainability and according to the current DNK[2] standard, vocational training is of fundamental importance as (1) skilled work has a large share of professional activity in our society, (2) which is performed with immediate effects due to its operational character, and (3) due to the high level of cognitive and reflective substance. It differs considerably from unskilled or semi-skilled work (which is common in other countries). Numerous publications have shown that the subject of sustainability has already arrived in vocational education and training (i. a. Klemisch and Rauhut 2009, Kuhlmeier, Mohorič and Vollmer 2014).

Occupational practice shows that technical work requires direct contact with raw materials, materials, systems, devices, equipment, products, etc. This is due to the operational-haptical character of technical work. Accordingly, when trainees and technical workers carry out technical work, they can immediately identify sustainability aspects or problems, such as "wastes". The technical workers' high level of reflection and their competences enable independent planning,

2 Abbreviation of "Deutscher Nachhaltigkeitskodex" – Engl.: The (German) Sustainability Code.

taking decision and actions. They have cognitive and affective basic prerequisites to understand and relate to sustainability aspects and problems from their immediate field of action, and thus to initiate a self-responsible approach to sustainability as well as to influence the manner of implementation in the overall company context.

Flat hierarchies, which can be found in the production and service areas, and the established quality management systems (CIP, shop floor management, TQM, among others) interconnect technical work with an extended reference and decision level. It can be assumed that sustainability issues occur during the operational process and are transported by effective cyclical processes to the appropriate decision-making body of the respective organisation. Technical workers can make informative or conceptual contributions in any of all phases. Thus, technical work can be identified as a highly effective development context for sustainable thinking and acting, for which it is important to acquire necessary competences.

In occupational and economic pedagogical research and in addition to basic representations (i. a. Fischer and Hahne 2007), the topic appears particularly in the context of domain-specific problems, e. g. Bannasch and Leicht 2014, Leicht, Bannasch and L'Assainato 2013; Feldkamp et al. 2014; Rebmann et al. 2014, Grantz, Molzow-Voit and Spöttl 2013). It is also present in connection with treating, promoting and supporting disadvantaged young people (Bojanowski, Ratschinski and Strasser 2005; Fischer et al., 2010). Extensive empirical research is recognised in this field. Multiple approaches and results from evaluation and implementation studies are published as well. This includes in particular the pilot projects of the BMBF and BIBB of the funding periods until 2010 (main thematic emphases summarised in Klemisch and Rauhut 2009 and 2010-2013 (Kuhlmeier et al. 2014) as well as scientific papers of the German Federal Environmental Foundation (i. a. Mertineit and Exner 2003). There are many publications concerning the thematic or methodical implementation of sustainability (or both) (e. g. Mertineit and Exner 2003; Nölle 2009; Schlömer 2013; Steenblock 2011). A few key questions remain unanswered. For instance, how can sustainability be implemented as a stable and fixed constant in the current curricular concepts (curricular research) or which intended effect can be demonstrated in vocational learning (impact research)? Does training and further education for teachers or training staff need further development to make sustainability more “interesting” in vocational education (research of professionalisation)? In this regard too, different BMBF-funded approaches (e. g. BMBF 2012; as well as the project KONWIKA: Seeber et al. 2014) to various aspects of occupational sustainable development can be identified. Versatile information and concepts as well as significant findings are available for pilot projects which are intended to disseminate good practice along the current state of research. These are suitable for the target group and found particularly in the approaches of Seeber et al. (2014). Moreover, the results of the studies on industrial-technical trainees by Petsch, Gönnenwein and Nickolaus (2012) and Grantz et al. (2013) are significant.

2.3 Sustainability and Professional Competence

The concept of competence, which is understood as an integrative educational perspective of occupational and school education, is stable concerning sustainability since the current understanding of the concept of competence comprises aspects of competence as well as aspects of willingness. The subject of sustainability is "proven" on a scientific and normative basis and the two core aspects of competence are generally to be considered as equivalent. At present, the question of redefining professional competence towards sustainability or whether the competence model developed at the Conference of Ministers of Education in 2011 needs to be adjusted or supplemented

seems to be irrelevant. Curricular aspects always play a subordinate role in the field of didactic-methodological innovations. These are rather to be expected to become the result in the target perspectives and to be incorporated as perspective curricular inferences as discussed by Kettschau (2013, 2014). It is plausible and widely accepted that while concentrating on action respective competences and a growing willingness can be developed while the concept of sustainability is integrated and implemented directly in various occupational activities, work processes and procedures in the respective profession. Consequently, such a "holistic" approach can have a professional, social and personal impact on competences.

Implementing the topic of sustainability in company-based training aims at a workable approach and derived as central premises from the current state of research.

1. Education for sustainable development requires future technical workers to think and act accordingly. Thinking and acting must be considered at the same time since both interact with each other and have a strong mutual influence.
2. In any case, sustainable thinking means exceeding simple and linear patterns. For this reason, relevant, divers, multidisciplinary and latest information must first be understood, internalised, processed discursively and evaluated.
3. Sustainable action must become a general integral part of reality. It must be taken up and developed to create a comprehensible context and alternative options. Eventually, the developed reality must change.
4. Protagonists from various areas with different perspectives such as professional, operational and education experts must be involved in sustainable action as this is the only method to unite specific action requirements, possibilities and scope of a real situation.
5. In industrial-technical training, the contexts for sustainable action should be as close as possible to the professional field of action. Not only the highest expertise of the trainees can be found at this point but also the highest degree of identification and social integration.
6. The direct involvement of vocational schools is necessary to ensure the expansion and relativisation of the direct company contexts, leaving room for intensive, knowledge-based, critical and collective engagement with reference areas, backgrounds, entanglements and antinomies of sustainability.

3 The pilot project NAUZUBI

Presenting information about the background, the consortium and the content orientation (chapter 3.1), the description of the pilot project NAUZUBI emphasises information on the current state of implementation of the project (chapter 3.2).

3.1 Background, Consortium and Substance of the pilot project

Within the BMBF and BIBB programmes, a total of 18 pilot projects are funded in three funding lines. Six projects of funding line I focus on the "Development of Domain-specific Sustainability Competences in Commercial Professions" and six projects in funding line II relate to "Design of Sustainable Learning Environments". Funding line II focuses on careers in the food industry. In funding line II, the organisational and personnel development aims at trainees and professionals

in vocational education and training to experience and influence the way of implementing sustainability in training and working practice in the respective work environment. The aim is developing indicators that defines clearly a sustainable learning location (BIBB 2016, p. 4). One of the six pilot projects of funding line II is NAUZUBI (ger.: Nachhaltigkeits-Audits mit Auszubildenden, engl.: Sustainability Audits with Trainees). It is a joint project of the University of Siegen and the TU Darmstadt with their practice partners.

The consortium responsible for the implementation of NAUZUBI consists of cooperating universities, companies and schools. To find ideal and adequate partners for the project, vocational schools have been contacted. The universities have known these schools from existing cooperations, considered them as particularly innovative and motivated and integrated them into the joint project. Subsequently, the vocational schools contacted companies with appropriate cooperation structures and with a special interest in the subject of sustainability. Over time, corresponding units were formed and consisted of schools and companies, or trainers and teachers. At present, these dyads of implementation develop individual single concepts. Within each concept, the trainees of each company are to develop a framework concept for a specific audit towards the four main pillars of the German Sustainability Codex. These concepts comprise training-strategic components that include process management of training, and focus on topics such as environmental issues, resources and climate as well as relevant social aspects (notably labour rights, equal opportunity and professional qualification).

The aim of NAUZUBI is to encourage companies to build an awareness towards sustainability now and in future. The focus is on the trainees from participating companies who are introduced to a sustainability project in the apprenticing company and supervised by instructors and vocational school teachers. In the further course, this project is referred to as the "Sustainability Audit" (Bormann 2006, Dasecke 2013). As the title of the pilot project reveals, auditing is used to anchor the topic of sustainability in in-company training.

Training-related auditing concepts exist for some years now (e. g. Dasecke 2013; Nobis et al. 2005). According to Nobis et al. (2005), a sustainability audit is subdivided into the planning phase (inventories, actual status), the implementation phase (sustainability management systems), the control phase and the evaluation phase. The sustainability audits comprise a cyclical process consisting of a) collecting specific (operational) relevant aspects of sustainability, b) the assessment and focus of these aspects, c) the internal work-up of the identified improvement areas, d) solution finding and generating measures, e) monitoring of measures and impact assessment and finally f) feedback to the individuals involved. The sustainability audits are based on the current standard of the "German Sustainability Code" (DNK) of the Council for Sustainable Development. Four areas are differentiated with a total of 20 individual criteria forming the basis for the content of the audit. This does not mean that all criteria must be fully implemented. The criteria are to be differentiated and specified in the context of training situations in the respective company. This results ideally in a coherent overall concept for training departments across all four main areas of the DNK[3].

The sustainability audits of this pilot project are based on DIN 9001, on the approach of Dasecke (2013) as well as on the stages of the audit on sustainability (Figure 1) as explicated by Bormann (2006). Sustainable thinking and acting requires an accentuated complex cognitive and affective discussion to support the transformation into operational reality. The nature and concept of the sustainability audit should lead to self-regulated and reflective action to solve sustainability problems. The following premises are set for this:

3 The fbb (Forschungsinstitut Betriebliche Bildung; engl.: Research Institute for Vocational Education and Training), in particular, has made a valuable contribution with its work being scientific support of funding line II.

1. The trainees must comprehend and internalise the concept of sustainability. They must be aware of the range of aspects concerning sustainability and in which (cyclical) processes it is anticipated.
2. The trainees must be convinced of the importance of sustainability and identify themselves with the implementation of sustainability into operational processes and work.
3. The trainees must understand the basic idea, process and implementation of company auditing and must be able to implement an (supervised) auditing concept in an appropriate manner.

Key prerequisite is a corporate culture in which a sustainability audit is accepted with interest and commitment and which is implemented accordingly for the trainees receiving encouragement and support. Additionally, to implement respective training units, it requires trainers and teachers who have identified themselves with the topic of sustainability and are qualified to teach and supervise the sustainability audit. In this respect, training courses and further education are provided.

On the basis of a specific learning environment in cooperation with vocational schools, sustainability has to be embedded in subject-specific education. It must be ensured that trainees have enough space to develop diverse and complex knowledge and to see the broader context of sustainability. Subsequently, they can discuss the topic with teachers and trainers on a factual, ethical and moral level. In order to align learning processes with the sustainability audit, a qualified teacher is required, who has internalised the topic of sustainability and who provides appropriate education and supervision before, during and after the sustainability audit. In this concept, the protagonists in the company and vocational school form cooperative units in a learning environment from the start. Contents, approaches and measures are geared to and continuously compared with each other. The overall process of the sustainability audit is set up as an in-house development and implementation concept and consists of the following:

1. Learning about “sustainability” in subject-specific education through information, analysis, reflection and hypothetical action.
2. Preparation of the sustainability audits in companies by trainers and trainees, development of a concept for the sustainability audit, information to all participants involved.
3. Implementation of the sustainability audit and subsequent self-evaluation in the company by trainers and trainees.
4. Reflection and relativisation of the sustainability audits of the company at the vocational school by teachers and trainees.

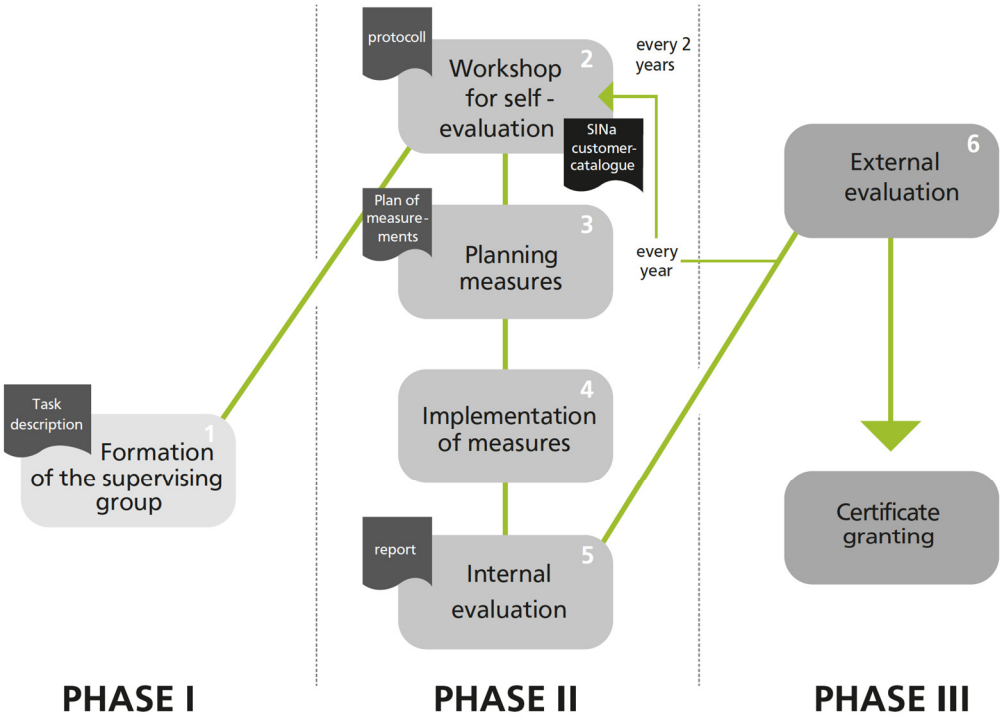

Fig. 1: Presentation of the phases and steps of a sustainability audit based on Bormann et al. (2004, p. 20).

The core process of the pilot project takes place in phase II. Along with reflexive learning and thematic preparation in the vocational school, it is accompanied, supervised by school teachers and company trainers, who communicate with each other on a regular basis.

4 Current implementation status of the project

Major objectives of the pilot project are 1) the development and implementation of sustainability audits by and with the trainees in their companies and 2) the establishment of companies as sustainable learning environments.

Both aspects require that the topic of sustainability is integrated and anchored into corporate organisational structures by establishing educational training structures in the long term. These structures should offer access to sustainability topics and ensure effective learning. To achieve this certain structure, the overall pilot project was segmented. This resulted in a project structure in which major goals and subordinate goals were defined and set. Starting and initiating the pilot project required first working meetings of the consortium. During these meetings, the work tasks for the two "reference area groups" were defined and specified, in addition to the overall strategy, and organisational elements for internal exchange and public visibility of the pilot project were introduced. In order to formulate concepts suitable for the specifics of the company and vocational school partners, the first step was to inquire about the company target characteristics, key values and needs of all six participating practice partners as well as to analyse the existing training structures and internal organisational structures. A guide, based on the discussions, covered the core aspects in four categories: values, structures, measures and parameters/indicators and ensured the

required comparability and integrability. In addition, a careful sifting of in-house and externally accessible documents was carried out with the focus on sustainability and organisational structure. The evaluations and analyses formed a basis on which company-specific concepts were formulated for further project duration and training concepts were defined for participating practice partners and three vocational schools. In the respective companies, the first sustainability workshops were held in 2017 with the trainees, which were well received by them. Further training concepts included supplementary workshops with different groups. For instance, audit concepts were formulated by the company's educational staff and knowledge about subject areas such as sustainability and quality management was increased in train-the-trainer workshops. Furthermore, new approaches were developed concerning cooperative tandems in learning environments and implementing the project topics in school. Prior to the implementation, the developed didactic-methodical concepts were analysed and reviewed. Thereby, the opportunity for amendments or modifications was given before the actual application. In the course of the pilot project, the overall concepts were further developed. The resulting concepts are intended to be understood as (the first) cooperative teach-learn situations with an environment for effective learning for long-term qualification of trainees in school and companies.

According to these findings, the aim of NAUZUBI is to anchor the project ideas within the company structures and to create a learning organisation. It results in company-specific implementation perspectives concerning the sustainability audit with a clear focus on selected aspects of the topic "waste". The trainees are introduced to the subject area "sustainability audit" in a practical and realistic manner by means of existing audit concepts and a selection of key figures related to the topic of "waste". They may apply the audits on waste in the learning workshops or monitor the consumption of raw materials and supplies based on key figures, with the sustainability aspects in mind. The operational implementations are discussed in class in the vocational school. This is achieved by the close cooperation between companies and university partners. Immediate real context is made usable as realistic learning opportunities in the context of auditing were created through workshops in the training departments. Learning events are assigned to the areas of energy consumption in compressed air generation, consumption of paper, cloths or fresh water. Relevant arrangements, preparations and conceptions have been completed. The direct implementation of the audits will take place in calendar quarters 3 and 4 of 2018.

5 Conclusion and Prospect

The general intention of NAUZUBI is that trainees develop their own sustainability audits and implement them directly within the company structures. In addition to the process of focusing on the training segment, companies are to change into "sustainable learning environments". To achieve this, different measures are implemented. The initial correspondence with the companies and schools, which has taken place considering the previously reviewed materials (including mission statements, sustainability agendas and training concepts), aimed at identifying development statuses of the sustainability issue. The following concretisations of the concept of sustainability audits were defined by using iterative loops: In addition to the discussions with the companies, workshops were organised in the two reference areas schools and companies but also for in the overall consortium. Thus, it was possible to consider the different development statuses and directions and to make them usable for NAUZUBI as a complete project.

"Waste" has emerged as a main focus in companies. 1) It can be used as cross-company framework, 2) it keeps company-specific development areas open and unrestricted and 3) it shows the

direct link between “sustainability” and “auditing”. Based on this approach, operational concepts and approaches have been developed to deal with waste issues in line with (company) specific requirements and means. Furthermore, trainees are being confronted purposefully with sustainability in the operational context. Immediate impressions and experiences of the implementation are to result from the forthcoming audits. These will provide first insights into the didactic-methodical conception and implementation of the audit approach as well as the preparatory overall process of operational concretisation.

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PROF. DR. DANIEL PITTICH
Universität Siegen
Naturwissenschaftlich-Technische Fakultät
Juniorprofessur für Didaktik der Technik
Breite Straße 11, 57076 Siegen
daniel.pittich@uni-siegen.de

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