Transfer for Sustainable Development at Higher Education Institutions—Untapped Potential for Education for Sustainable Development and for Societal Transformation

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Abstract:

Higher education institutions (HEIs) are increasingly confronted with societal needs beyond research and teaching. These include sustainable development and technology transfer as well as the practical application of knowledge and ideas. Several HEIs already put sustainable development and transfer into practice. These practitioner–university partnerships comprise a broad range of actors, disciplines, topics, and formats. However, transfer activities that contribute to sustainable development in society still make up only a very small part of HEIs' activities. In response to calls from society as a whole, HEIs could combine transfer and sustainable development more systematically. In this article, we suggest a concept of transfer for sustainable development. The focus is on sustainability transfer in teaching. We used mixed methods for this conceptual work: exploratory workshops, expert interviews, and a case study of transfer in teaching. One of the results presented in this article is a working definition of sustainability transfer at HEIs. In addition, six characteristics for describing sustainability transfer in its various forms are formulated. This conceptualization makes it possible to analyze the diversity of HEIs' sustainability transfer activities; it helps to identify and encourage potential transfer actors at HEIs as well as practitioners, and, thus, tap the full potential of sustainability transfer.

Keywords: sustainable development; higher education institutions; university; transfer; practitioner–university partnership; societal impact; education for sustainable development

1. Introduction:

Linking Transfer and Sustainability at Higher Education Institutions

Higher education institutions (HEIs) or universities (which include universities of applied sciences), can make important contributions to sustainable development if they structure their teaching, research, and operational tasks to be sustainable. In keeping with a whole institution approach, the initial focus is on the internal relationships within the organization. This article broadens the viewpoint as it addresses the external relationships of universities, i.e., their interactions with actors outside the university system. The latter are referred to hereinafter as practitioners.

This view from the outside is in line with a trend in recent years that societal actors are placing new demands on universities in Germany that go beyond the core tasks of teaching and research.

The intention is therefore to intensify and improve the transfer of knowledge, ideas, and technologies to society. The goal is to enable knowledge developed at universities to be applied more directly and more rapidly in practice, thereby satisfying mainly specific societal needs. This is also discussed under keywords such as societal impact or third mission [1, 2]. Furthermore, universities are called on to become active

in the area of sustainable development and to research, teach, and become more sustainable themselves to serve the common good [3].

This article links the areas of transfer and sustainable development focusing on transfer for sustainable development—in short, sustainability transfer. This is seen as having great potential for development because solving sustainability problems requires cooperation between actors from very different sub-systems in society. Universities can contribute theoretical and empirical knowledge, methodological competence, criticism, and reflectivity to achieving this goal. This is associated with a claim by universities to contribute to shaping sustainable development in society through cooperation between practitioners and universities, always understood as an extension and differentiation of the university system, not as a normative guideline for academia [4]. Many stakeholders in universities propose a role change in this process. While they are aligned with the academic system in terms of teaching and research, in the case of sustainability transfer they are dependent on cooperation with practitioners and are one of many societal actors [5]. They operate in a field that is determined by societal problems and demands and where they are confronted with "real life". This necessitates an inter and transdisciplinary approach because specialized disciplines cannot sufficiently address the complexity of social-ecological systems. The challenge to scientific thinking that this involves can provide impetus for sustainable development, but there are certain prerequisites.

A broad range of sustainability transfer activities can be observed at HEIs, such as in research and teaching in two cases in Germany: the Leuphana University Lüneburg implemented the Innovation Incubator (2009–2015), a research driven project for regional development where about 250 researchers implemented 45 regional projects the Eberswalde University for Sustainable Development has established the InnoForum Ökolandbau Brandenburg, a regional network of about 80 organic farmers and businesses along the entire organic supply chain, allowing for on farm teaching in the universities' organic farming programs (http://innoforum-brandenburg.de). Other examples include the School of Sustainability at the Arizona State University that links academics with practitioners in the community who are implementing sustainability solutions (https://schoolofsustainability.asu.edu/about/school-of-sustainability/) and the Community Engaged Learning program of the University of Toronto where students work for 5–7 hours per week with a non-profit organization or social enterprise specialized in front-line service provision, community-based research, community development, or educational work.

These inspiring examples raise the question of how to grasp the diversity of such practitioner–university partnerships. It is helpful to understand how sustainability transfer works, what universities are already doing, and where development potential exists, but also where there are limitations. How can such cooperation be described, analyzed, and, if necessary, further developed? This paper therefore aims to present an initial conceptual description of sustainability transfer for universities in Germany. This will enable relevant activities at universities to be identified, made visible, and analyzed in detail.

In view of the diversity of sustainability transfer [6], the focus here is on sustainability transfer in teaching so that the conceptual ideas can be tied to a specific area of focus. Several case studies of transfer in teaching point to an enormous potential for concrete, low-threshold contributions to sustainability with students as transfer actors [7–10]. However, such teaching approaches have so far received little attention in HEIs as a whole and their potential remains untapped. Against this

background, the article examines the question: How can sustainability transfer at universities be described in conceptual terms using the focal area of teaching as an example?

To answer this question, Section 2 looks at the position of transfer and sustainable development in university practice. The methodological process used for the qualitative empirical investigation is then outlined (Section 3). Section 4 presents the empirical results, which are used to derive a conceptual description of sustainability transfer (Section 5). Finally, this draft concept is discussed in the context of its implementation in teaching and the whole institution approach (Section 6).

2. Background of Sustainability Transfer—Positioning in University Discourse and Practices

The conceptual description of sustainability transfer is meant to tie in with the practices and discourse of universities with a view to making it compatible with day-to-day university operations. Consequently, the focal areas of transfer and sustainability are explored in the context of (a) discourse on university policy, (b) practical implementation, and (c) scientific approaches relevant to the actors involved. The idea of sustainability transfer is positioned against this background.

Transfer as a Focal Area

Transfer has gained in importance in higher education policy discourse. The German Council for Science and Humanities stresses the practical orientation of transfer, whereby scientific knowledge is to be applied "as broadly as possible" through cooperation [11] (p. 35). The German Federal Ministry of Education and Research (BMBF) is also attaching increasing importance to transfer in this sense [12]. An important role is played here by the "Innovative University" funding initiative to promote a research-based transfer of ideas, knowledge, and technology from universities of applied sciences, and small and medium-sized universities. Since 2018, 48 universities have received funding in 29 transfer and innovation projects. State ministries also want to improve cooperation between academia and the private sector, policymakers, and civil society; for example, the State of Brandenburg with its transfer strategy [13].

Many individual actors are involved in practical implementation; they pursue the most diverse facets of transfer, with a wide range of different partners from practice. Just as diverse are the forms of implementation, such as technology and knowledge transfer, further training, consulting, participation in social and cultural life, participation in policymaking, science communication, contracts with companies, public agencies, and municipalities, etc. [14] (p. 13). At universities of applied sciences, transfer has a long tradition, especially with companies.

Many universities have established transfer offices or transfer centers to provide targeted support for these kinds of activities. The transfer audit of the Stifterverband für die Deutsche Wissenschaft, a German organization that seeks to address challenges in science, research, and higher education, in which 33 German universities participated between 2015 and 2018, provided stimulus for discussion of the issue. In the meantime, several universities have defined their own transfer strategies, which were prompted, among other things, by the transfer audit and the "Innovative University" funding initiative, which made a transfer strategy a prerequisite for submitting applications.

The understanding of transfer has changed. This is relevant for the conceptualization of transfer of universities. The traditional understanding is based on technology transfer, which involves transferring scientific and technical findings from research to companies for use in the production process [14]. The term has been

expanded to include knowledge and research transfer, which means the transfer of research findings from all scientific disciplines for use in companies, but also in municipalities, public administration, and civil society actors, including policy consultation. Regional economic clusters and innovation systems around universities and research institutions are examples of this definition of transfer [15]. Against this background, Roessler et al. [14] characterize transfer as reciprocal relationships in which the activities of universities have a direct impact on society and the economy and vice versa, as trends from the private sector and society are reflected in the university [14] (p. 39). Even broader is the concept of the third mission. Alongside teaching and research, this "third mission" is defined by higher education institutions as interaction with external actors outside the university, which relates to societal needs and which cannot be met by conventional teaching and research alone, but is at least loosely associated with them [1] (p. 18). The third mission includes involvement in society (including cultural, social, and environmental activities), technology and knowledge transfer (including science communication, policy advice), and further education [1,2]. There is a big overlap with similar concepts like the social responsibility of universities, entrepreneurial university, societal collaboration, service learning, living labs, etc. [6]. Trencher et al. criticize that the focus of the third mission is often narrowed down to economic contributions, namely through technology transfer. For this reason, they suggest as a fourth mission the co-creation of sustainability, characterized by collaboration with diverse social actors, to create societal transformation in a specific location, region, or societal sub-sector and based on the values of sustainable development. This fourth mission is more than a mere offshoot of the third mission—it is a differing but compatible mission on its own [6].

Sustainable Development as a Focal Area—with the Focus on Teaching and Education for Sustainable Development

The higher education policy discourse on sustainable development is shaped by the United Nations Sustainable Development Goals (SDGs) and the UNESCO World Programme of Action on Education for Sustainable Development (ESD) (2015–2019), which is specified in more detail in the National Action Plan for the implementation of the World Programme of Action for Germany [16] and the recent UNESCO framework "Education for Sustainable Development: Towards achieving the SDGs" (2020–2030) [17].

The BMBF has been supporting sustainability research for about 20 years now, with funding priorities including socio-ecological research, the Research for Sustainability program (FONA), and the Sustainability in Science Initiative (SISI). In this context, the BMBF specifically supports sustainability activities of research organizations (LENA project), students (netzwerk n), and universities through the collaborative project Sustainability at Higher Education Institutions: HOCHN, around which a network of sustainability actors from more than 100 German universities has formed in the meantime. As the representative body of higher education institutions in Germany, the German Rectors' Conference (HRK) 2018 declared its commitment to firmly enshrine the goal of sustainability at German universities along with a culture of sustainability [3].

Given the many definitions of sustainability, one challenge in the practical implementation of sustainability is to clarify the underlying understanding of the term, to incorporate it into university operations, and make it explicit so that it is accessible for scientific analysis and criticism. Possible starting points could be the guiding sustainability principles of individual universities or a university-wide understanding of sustainability, such as the

one developed in the collaborative HOCHN project [18]. The same applies to the reflective framework for research in social responsibility of non-university research institutes [19]. Another conceivable point of reference are sustainability concepts legitimized through established policies, such as the 17 SDGs of the United Nations or the German Sustainability Strategy.

The central areas of focus for implementing sustainability at HEIs are teaching, research, and transfer [6], as well as the universal themes of governance, operations, and reporting, which are the subject of research at HOCHN. Just as in the area of transfer, there are many, very diverse initiatives at universities, making an overview difficult.

Since teaching in particular is viewed here as a key area for the practical application of sustainability transfer, ESD will be examined as a central concept. ESD is an international, value-based concept that plays a special role in the process of implementing sustainable development [17,20]. At universities, this concept represents an opportunity for sustainability transfer in teaching, as shown in Figure 1, because "socially responsible science means that HEIs provide the orientation knowledge necessary for social transformation" [21] (p. 51). Sustainability transfer in teaching should work towards sustainable development through ESD. This entails content-related and methodological-didactic requirements for universities, such as dealing with real-life, job, or training-related sustainability problems [22]. Teaching formats, such as projects related to the degree program (learning in real-world situations), are suitable for this purpose. This is where the life and experience of the learners comes into play and where actual sustainability problems from the real world are addressed or solved with the university actors as equal partners.
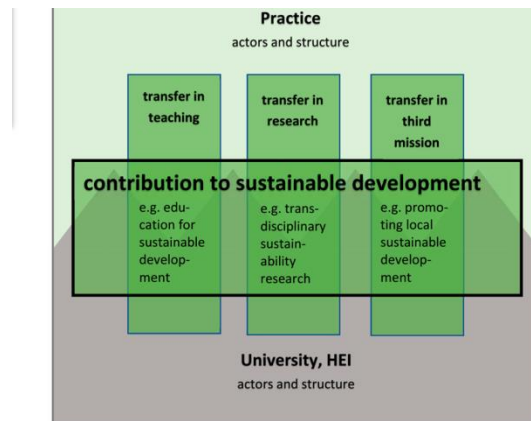

Figure 1. Positioning of sustainability transfer in the context of higher education institutions.

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These learning experiences are therefore of great importance, as they are acquired in practice (real social contexts) and can be studied or reflected upon in a theoretical framework. This means that the place of learning is not just the university, but also the public space or the working and living environment of the practice partners and the issues they work on. This format of project-based learning allows students a high degree of self-determination (and thus results in a high degree of participation). Since the world can be described as a complex, interconnected ecological, psychological, societal,and economic system, this requires a systemic approach from multiple perspectives. Many issues and complex themes, such as biodiversity, climate change, poverty alleviation, health, natural resource management, production, and consumption, are closely interwoven and are reflected in the 17 SDGs [23–25]. An important element of ESD is competence-based teaching, which is particularly relevant to sustainability transfer processes [20,26,27]. The following competencies are addressed by sustainability transfer processes:

• Systemic and forward-looking thinking because topics relevant to sustainability in university teaching are complex, often ambiguous, and in some cases, full of uncertainty; many things are interlinked and systemically interrelated;

• Ability to cooperate, negotiate, and participate, because sustainability transfer in teaching requires participation in the discussion of sustainable development issues and a shared decision-making process;

• Ability to reflect on personal values and those of others in the context of sustainable development and on one's own role in local communities and (as citizens of the world) the global context, since issues and problems relevant to sustainability do not stop at national borders;

• Empathy, which includes mutual understanding and respect for the needs, ideas, and activities of others.

In summary, the aim of ESD in higher education is to enable students to engage with the major changes of our time from a scientific point of view (understand), to assess the resulting consequences from the perspective of sustainability (evaluate), to rethink the relationships between human beings and nature (change), and to assume responsibility to be able to actively participate in society's transformation toward sustainability [28].

In research, a transdisciplinary sustainability approach is well suited to the topic of transfer [29], as shown in Figure 1. The core element is transdisciplinary exchange with practitioners, where heterogeneous groups of actors shape a common process of learning, impact, and reflection [30,31]. Building on this, transformative sustainability research aims to support transformation processes in the direction of sustainability through innovation and to promote the process of change in society through the scientific development of concrete solutions and innovations in industry and society [32,33]. One interesting approach to transdisciplinary research with a high level of transfer relevance are real-world laboratories where HEIs, municipalities, NGOs, companies, government institutions, associations, etc. work together to find sustainable solutions. Under the guiding principle of sustainable development, they join forces as pioneers of change in real-world laboratories and conduct experiments to develop, test, and research new ideas [34].

Interim Conclusion

Both the overview of practices and discourse at universities and an evaluation of academic literature show that an understanding of sustainability transfer can draw on both HEI concepts of transfer and sustainable development. Transfer can be described as a partnership between practitioners and universities exchanging technologies, knowledge, and ideas in the focal areas of teaching, research, and a third mission. When the protagonists relate their transfer activities to sustainable development, it can be termed as sustainability transfer. There are even specific approaches that are in line with sustainability transfer in teaching, namely in ESD, and in research, especially transdisciplinary sustainability research. Reliable, as well as innovative, approaches are problem and project-based learning, service learning [8], research-based learning, as well as transdisciplinary research projects (such as action research or real-world laboratories [34]).

Based on this initial evidence, it seems possible to link the university themes of transfer and sustainable development, as shown in Figure 1.

Even though there are interesting and inspiring cases, sustainability transfer has so far hardly been explicitly addressed by HEIs and does not play a significant role in university governance in Germany. Considering the enormous potential for HEIs to contribute to sustainable

development through direct interaction with practitioners, it would seem to be a promising endeavor to systemize and conceptualize the notion of sustainability transfer for analyzing the broad range of activities to attain a better understanding of transfer mechanisms and their impacts in the university setting. Such a science-based concept can be used as a reference by the actors involved for further developing their transfer activities.

3. Materials and Methods

The empirical study for the development of a sustainability transfer concept was broken down into three steps: first, an exploration through expert discussions and workshops with actors working in the areas of transfer and sustainability; second, an empirical survey of experts on transfer; and third, an empirical study on the implementation of sustainability transfer in teaching to identify a concrete teaching format.

In line with a heuristic approach, the first step was to develop a working definition and to test its acceptance in workshops. An initial working definition and elements of sustainability transfer were outlined and presented in four workshops in 2017. These workshops specifically addressed transfer actors, including actors from all university levels as well as practitioners from the private sector and public administration. Participants in these workshops therefore included actors from university administration, students, students' self-administration organizations, research and teaching staff, as well as representatives from the private sector and public administration. Established transfer activities, results, and proceedings of implemented projects and potential new formats were discussed. Workshops therefore provided an overview of different existing activities with a regional impact and analyzed to what extent these projects can already be considered to be transfer activities and how they can be developed further. Cooperation with the student association netzwerk n was helpful in this process [35]. With the help of examples, aspects of sustainability transfer were explored in greater depth, terms were clarified, and the working definition fine-tuned.

In the second step, categories for the analysis of expert interviews were identified based on this exploratory study (Step 1) and further reading. In addition, questions were asked about the focal areas of teaching, research, and the third mission, although only teaching will be addressed below.

Interviews were conducted with seven transfer experts in April and May 2018. The aim of the interviews was to examine and validate the initial conceptual ideas and to position sustainability transfer in the context of academia and HEIs. The experts were selected on the basis of their publications and the focus of their work with different university and non-university based backgrounds. Two of them manage university transfer offices and four work in the area of HEI research and consultation either at university institutes or in foundations, thus providing an overview of transfer activities inside and outside of universities. One expert works in transdisciplinary sustainability research and teaching. They cover a wide range of expertise and research inside the university in the field of transfer and third mission. The aim was to describe sustainability transfer from different perspectives.

The methodological approach to the guideline-based expert interviews and the qualitative content analysis is based on Gläser and Laudel [36]. The interviews were exploratory, and some were conducted as conversations lasting about one hour. They were transcribed using the MAXQDA tool and analyzed using a category system. The categories were initially developed deductively on the basis of theory and the explorative workshops and then supplemented inductively during the course of the evaluation, resulting in main

categories such as basic understanding of transfer, actors, interaction and formats, framework conditions, third mission, and transfer in relation to sustainability. The relevant statements were extracted from the text by means of coding and redundancies were then eliminated. The material was merged in evaluation documents under the main categories to render the interpretation steps transparent. Characteristics and description categories for sustainability transfer were identified on this basis.

In the third step, these key aspects were applied to a case study of sustainability transfer in teaching in order to test and validate the analytical categories. Step three was designed to gain concrete empirical insight into the implementation of sustainability transfer, not as best practice but as a regular case study with strengths and weaknesses. Sustainability transfer was analyzed in a concrete teaching format as part of a master's thesis in 2019. The subject was the module "Projektarbeit und ganzheitliche Projektgestaltung" (project work and holistic project design) in the master's degree program Regional Development and Nature Conservation (M.Sc.) at the Eberswalde University for Sustainable Development [37]. In this module, working groups of four to six students design and implement a regional development project together with a practice partner. It is a compulsory module with 12 credits of the European Credit Transfer System.

The following research question was pursued in the master's thesis: How can students, as participants in sustainability transfer, shape sustainable regional development? In total, reports of 17 student projects from the winter semesters 2016/17 and 2017/18 were evaluated, and six of the reports built the data as detailed case studies. These reports consist of (a) a content-related project report and (b) a presentation of the process and project management. Twelve documents from the case studies were thus evaluated using qualitative content analysis. The following criteria, among others, were considered: forms of interaction, methods for structuring interaction, role of students, factors influencing the cooperation process, types of results, and links to sustainability.

In addition, six exploratory interviews were conducted with the practice partners in the six case studies in order to assess the learning and impact potential of the projects on the part of the practice partners.

4. Results for the Description of Sustainability Transfer

This section presents the results of the workshops held to explore and refine the investigative categories for the expert interviews. The results of the interviews and of the in-depth study on the implementation of sustainability transfer in teaching are also presented.

Exploring the Characteristics of Sustainability Transfer for Investigative Categories Starting from the approximate understanding of the transfer and sustainability activities of HEIs, as shown in Figure 1, the discussion in the explorative workshops highlighted the following aspects that needed further consideration.

In one workshop with researchers, lecturers, and transfer office staff, a first draft of a description of sustainability transfer was presented and discussed. This basic understanding included the content, goals, and success criteria of transfer. A difficult question was the distinction between transfer and the third mission of universities. Another workshop with practitioners from business and public administration explored the transfer actors. This included a broad range of diverse groups of actors on the practitioner side from large companies to individual citizens, their roles, motivation, and interest in practitioner–university partnerships. In addition, a large variety of forms of interaction and specific cooperation formats in teaching, research, and a third mission were described. Two workshops

with students and lecturers were dedicated to transfer in higher education. The discussion explored the interests of students and lecturers in transfer (relating also actors and forms of interaction).

Framework condition was a topic in all four workshops. Potential, restrictions, and preconditions of transfer were discussed, focusing on the general conditions of transfer at HEIs with regard to structures, organizational conditions, relevance for university development, transfer strategies of HEIs, and organizational restrictions. A crucial topic dealt with in all four workshops was how to generally differentiate transfer from transfer for sustainable development. The discussion touched on possible definitions of sustainability and the understanding of sustainability in practitioner–university partnerships, different sustainability goals for transfer activities, the sustainability impact of transfer, varying levels of ambition in terms of sustainable development.

The following investigative categories for the expert interviews were identified in the four workshops:

• Basic understanding of transfer including a differentiation between transfer and third mission.

• Actors and forms of interaction.

• General conditions of transfer.

• Sustainability in transfer.

Characteristics of Sustainability Transfer

The interviews with the transfer experts were evaluated using the above-mentioned research categories.

Basic Understanding of Transfer and how it Differs from the Third Mission

Several experts adopted a broad understanding of transfer comprising (nearly) all activities of HEIs related to society and non-academic actors (Experts 1, 2, 6). Transfer activities range from intellectual property, and business start-ups to university for children or exhibitions. The concept of transfer has meanwhile been broadened from the traditional understanding of transfer. It started with technology transfer in the 1990s incorporating more and more aspects, such as research and technology transfer, later knowledge transfer, and recently just transfer (Expert 6). Especially the transfer office staff that was interviewed think that quite a lot of transfer activities are taking place at HEIs (Experts 2, 6).

Instead of a one-way transfer from the university to practitioners, the experts emphasize mutual exchange and dialogue as a central feature of transfer, which may encourage the transfer concept (3, 4, 5). As a result, not only technologies, knowledge, and ideas are transferred, but concepts, views, and values are also exchanged in more integrated forms of interaction (Expert 1). Nevertheless, transfer may also include unidirectional activities and formats like public lectures and popular scientific publications (Expert 7). Even though there are a broad variety of transfer activities, not all university members are required to engage in transfer activities. Whether transfer is useful and productive depends on the topic, the disciplines, and the actors (Expert 3).

Universities produce knowledge in research and teaching that can be rendered useful to society through transdisciplinary formats in research and teaching. In these debates, universities can argue that the knowledge they produce is useful to society. In general, all members of HEIs can become transfer actors (Expert 2). To date, universities and transfer offices have focused on transfer linked with research (Experts 2, 6). Transfer in teaching plays a less important role and is not specifically addressed by a transfer office (Expert 2). However, a clear distinction between researches and a third

mission or teaching and a third mission in relation to transfer is needed (Expert 7).

Transfer activities are often motivated by researchers who are interested in applying their results and putting them into practice. As a result, they contact transfer offices of HEIs (Expert 6). Universities are interested in bringing new products and services that were developed in their organization to the market. Moreover, it is in the university's interest to have these products and services contribute to sustainable development (Expert 2).

In a broader sense, universities' efforts to support social change and transfer can be seen as a means to this end (Expert 2). They have the potential to create social and technical innovations linked to environmental goals by providing arenas for societal discourse and experimentation (Expert 3). In transdisciplinary sustainability research, e.g., in real-world laboratories, research goals are often adopted from practitioners. This is an example of how practice may shape transfer and its aims (Expert 7). Experts suggest making the goals of transfer transparent because HEIs' activities are financed by public money and they have a responsibility to society (Experts 1, 2). Transparency is thus seen as one success factor (Expert 1). However, concrete goals for transfer activities may also constrict and reduce the scope of action for the transfer partners. For this reason, it may be wise not to overburden the goals of transfer activities but to maintain sensitivity to the actors, the process of cooperation, and the blind spots of academia (Expert 3).

Confronted with a broad range of goals, actors, and topics of transfer, the experts interviewed called for a differentiation of transfer activities. For example, they differentiate between the duration and degree of the institutionalization of cooperation as well as the trust between transfer partners (Expert 1). In general, it seems useful to distinguish between the

degrees of complexity of transfer in order to internally analyze the organization's own transfer activities. However, these degrees of complexity do not imply that one form of transfer is rated "better" or "worse" than another (Expert 1). When asked about the potential conceptual differences between a third mission and transfer,

the transfer experts interviewed admit that there is a significant overlap between the concepts (e.g., Expert 1), nevertheless, they try to differentiate between them. The third mission is seen as an approach to encourage universities to engage with challenges relevant to the region and society as a whole. The third mission aims to motivate the universities to adopt a positive approach to their societal activities, to communicate them more effectively to the outside world, whereas transfer focuses on the central tasks of the university itself, i.e., teaching and research, in order to develop them further by engaging with practice (Experts 4, 5). In line with this thinking, the third mission opens the door for cooperation with practitioners. In addition, it is seen as the broader concept, including the prerequisites and structures, as well as the impacts and consequences of the practitioner–university partnerships, while transfer is restricted solely to the activities of dialogue and providing knowledge (Expert 1). The third mission includes all external relationships of HEIs with society in a broad sense (Expert 6). The term third mission also has a pragmatic aspect. The third mission is easier to link with teaching and research, while transfer is rooted in the traditional image of a unidirectional dissemination of technologies and knowledge (Experts 4, 5).

However, transfer has many facets, and transfer and the third mission overlap to a large degree, making clear-cut definitions and differentiation difficult (Expert 2). The problem of a clear distinction is not only an academic question, but also a practical question for teaching and research that

needs to be resolved for each transfer activity (Experts 4, 5).

Actors and Forms of Interaction

On the HEI side, transfer actors include all members of the university, such as researchers, teachers, students, university management, and administration, e.g., sustainability officers or transfer offices (Experts 1, 2). The non-university partners include companies and economic actors, policymakers, public administration, civil society organizations and initiatives, as well as citizens; in general, all non-academic actors (Expert 2).

HEIs cooperate with companies in different ways. Some companies seek out partnerships, some companies are interested in sharing knowledge, and others have no interest at all. For universities it could be an advantageous strategy to try and acquire companies that are interested, but not yet involved (Expert 2). NGOs are another partner for transfer because they often rely on scientific findings (Expert 3). More sophisticated partnerships include different groups of actors at the same time, including policymakers, entrepreneurs, and civil society groups (Expert 6). The most important transfer partner are still companies, but NGOs and social organizations have increased in number and awareness over the last years. Citizens and the public are not yet represented in practitioner–university partnerships (Expert 2).

The different transfer forms and formats of interactions enable a range of possibilities for cooperation in teaching, research, and the third mission. The form of cooperation between the participants is characterized by the fact that the transfer activities take place in a societal context in which transfer is collaboratively shaped for the mutual benefit of the transfer partners. The topics and contents transferred are determined by the interests of the transfer partners and their scientific and/or practical needs (Expert 1). In this context, there is a scientific link with

at least a loose correlation to teaching and research (Experts 4, 5).

Experts suggest differentiating between forms of interaction, for example, between short-term and long-term cooperation or direct and indirect forms of interaction, such as exhibitions or leaflets without face-to-face contact (Expert 1). Further, the side initiating the transfer often defines the logic of the cooperation. When an HEI shapes the partnership, research (or teaching) logic is predominant, but when practitioners are in charge, the partnership is instead geared towards practical outcomes (Expert 7). The assessments of the transfer experts differed on this point in the interviews. While some considered reciprocity to be a fundamental prerequisite for transfer, in order to identify problems, ascertain expectations, and be able to conduct a process of reflection involving all transfer partners, others emphasized the transfer form of contract research, in which reciprocity plays a lesser role because this transfer is unidirectional (Expert 6). Reciprocal exchange helps to identify the interests and needs of the transfer partner and feedback loops help to adjust mutual expectations and foster learning processes (Experts 2, 6). This encourages multiple perspectives on a problem and the incorporation of different forms of knowledge and expertise (Expert 3), thus stimulating innovation (Expert 1).

A partnership on equal footing accepts different forms of expertise and values different contributions to the transfer cooperation. Mutual respect is a prerequisite for building trust and more complex forms of joint knowledge production (Experts 1, 2, 6). This is a crucial element of transdisciplinary research (Expert 7). However, not every form of transfer is necessarily a reciprocal exchange on equal terms; the formats may vary according to the actors and topics (Expert 7).

General Conditions for Transfer

During the expert interviews it was stressed that the success of the transfer also depends on general framework conditions. A distinction must be made here between the overarching structural conditions which are determined outside of the HEI, e.g., by laws and financing, and the organizational conditions for implementation, which can be shaped by the HEI itself.

University management has a certain amount of freedom to influence the conditions for implementation; it can create structures that coordinate and support transfer activities (Experts 2, 3). Transfer offices in particular play a key role in this respect. They can reliably assume recurring tasks, pool and process knowledge, and establish and maintain contact between potential transfer partners. Transfer offices are thus key points of contact for actors interested in transfer from the university and from practice and are important in establishing contacts and formalizing transfer activities. Last but not least, they can support the transfer partners with suitable methods, formats, and communication (Experts 1, 2, 3, 6). University management and transfer offices may create a culture of facilitation (Experts 1, 7). In addition, some interviewees suggested setting up incentive systems for transfer and creating scope for developing transfer projects and concepts in day-to-day operations alongside teaching and research tasks (Experts 1, 2, 7).

This in turn relates to the overall structural conditions. Policymakers can, for example, provide universities with targeted resources for transfer and transfer offices, establish transfer-friendly funding formats, or raise the standing of transfer (for sustainable development) at universities, so that commitment in this area is also rewarded by additional funds, career opportunities, and reputation for the university (Expert 2).

Sustainability and Sustainability Transfer

Generally, the sustainability aspect of, or even impact on, transfer activities are difficult to assess due to the vagueness of the term sustainability. For this reason, it is important to create our own specific definition of sustainable development and/or refer to a widely accepted definition (Expert 7). Sustainability transfer may, for example, aim to bring about sustainable development in a certain region or municipality (Expert 1). Policymakers call on researchers to define the concept of sustainability more precisely so that it can be implemented through political measures (Expert 6).

The interviewees considered it important here to assess the contribution of sustainability transfer and thus make it tangible. This would also be helpful in assessing the impact of the projects and raising awareness of the effects of the transfer activities (Experts 1, 2, 4, 5). An impact analysis is thus an important feature of sustainability transfer, which can be used on the one hand to assess the impact of transfer projects at an activity and message level and, on the other hand, to enhance the reflection process among those involved in the transfer by creating awareness of their own actions and their impact.

Experts interviewed consider it possible to link transfer explicitly with the concept of sustainability (Expert 6). However, they were also critical of the use of the term sustainability transfer because it restricts transfer activities to a very specific field of transfer that only applies to a small part of HEIs' transfer activities (Expert 1). This specific idea of transfer activities narrows the scope for transfer actors (Expert 2). Some recommended using only the concept of transfer and adopting a multi-pronged approach, with sustainability research being one possible variant (Expert 6).

Case Study of Sustainability Transfer in Teaching

In the case studies investigated on project work in sustainable regional development, the students first begin by conducting a problem analysis with the involvement of the respective practice partners and thereby

established links to sustainability in their projects. When clarifying the transfer task in the conceptual development phase, goals are formulated on the basis of the problem analysis together with practice partners and other relevant project actors, who focus on a contribution to sustainable development in the regional focal area of the practice partners. The students thus first establish a link to sustainability in the transfer project. Second, they agree on concrete and transparent goals with the practice partners to promote sustainable development.

One quality characteristic of the students' activities in the projects is the active involvement of the practice partners in determining the technical and content-based focus of the project, identifying mutual expectations, and weighing up the options for action, taking into account the general conditions of the module.

The involvement of the practice partners goes beyond clarification of the task and continues throughout the product development process. The intensity of the relationship becomes clear in the process. The students engage in a continuous feedback loop with the practice partners to get feedback for decisions that show the way forward and to incorporate new findings into the clarification of the task and thus adapt the goals. The core element of participation is often workshops that bring together all relevant actors. This is where different requirements are discussed, topics identified, and solution strategies developed. This co-production is particularly highlighted by the practice partners, because the students create a strong impetus that has a transformative effect on the actors' environment in the process. This participation and its impact are mentioned more often as the success of the cooperation project than the actual end product.

The students' perception of their role in the project group and their methodological competence are of particular importance for the feedback and adaptation processes and for the active involvement of relevant actors. The students see themselves as a learning organization in the project groups, which makes them flexible and willing to learn in their interaction with the practice partners and open to changes to goals. They make targeted use of methods that they have learned during their studies in the process. For example, an environment analysis is carried out during project implementation in order to identify and involve relevant actors. The workshop structure is based on facilitation techniques.

The projects in the case studies have a wide range of objectives. They often have a structural and strategic focus—structurally, to give the practice partners concrete options for action so that, for example, decision-making processes in administrative workflows can be improved, and strategically, in order, for example, to identify concrete development opportunities for an organization as part of a socio-ecological transformation.

The concrete end products of student projects are often concepts and tools that usually cannot be implemented or applied with the practice partners during the project. However, they were used after the projects were over; for example, for project applications, to develop guiding principles and improve decision-making processes. The surveyed practice partners described the quality of the end products as innovative and creative, which inspired new ideas. One special learning effect for the students was the opportunity to apply the knowledge and methods acquired through the project-based form of learning. The practitioners benefited from this, as they were able to acquire new knowledge and methods and, in some cases, to develop new attitudes and viewpoints by working together with the students and to incorporate these into their workflows.

5. Evaluation: Conceptual Description of Sustainability Transfer in Relation to Teaching

A concept for sustainability transfer was developed against this empirical background and in line with the research literature. First, a definition of sustainability transfer is presented and then six analytical descriptors are outlined.

Sustainability transfer is defined as a specific form of transfer, namely those practitioner–university partnerships that contribute to or strive for sustainable development in society. A key characteristic is a mutual exchange between university and practitioners, because no group of actors can implement sustainability on its own. However, the degree of complexity and intensity of such practitioner–university partnerships may vary from a more unidirectional transfer (of technologies) to a co-production of knowledge and practical solutions (cf. Section 5.6.). Academia can contribute theoretical and empirical knowledge, methodological competence, criticism, and the ability to reflect. The goals of sustainability transfer are first to make concrete contributions to sustainable development, such as projects, concepts, or discussions about sustainability. At a minimum, transfer partners should formulate explicit sustainability goals for their respective transfer activities. Further, they should strive to make their societal impact transparent and minimize negative effects as far as possible. Second, it is important to strengthen the capacity of the transfer partners to act. Through interaction, the actors can learn from each other and develop key competencies for sustainability, such as the ability to innovate, systemic thinking, foresight, and strategic and normative competence [38].

Although this definition creates a framework for sustainability transfer, the corresponding practitioner–university partnerships can still cover a wide range [6]. Different transfer activities can be analyzed using the following descriptive characteristics.

Sustainability Focus of the Transfer Activity

The classification and evaluation of the sustainability focus of transfer, understood as a contribution to sustainable development, is a central requirement for defining sustainability transfer and avoiding arbitrary use of the term. However, there are currently no generally recognized and reliable measurement and evaluation methods that can be used to clearly capture the sustainability impact of academic activities and especially of sustainability transfer [39]. This is why we propose three approaches to the issue of sustainability focus.

First, it can be verified whether or not the transfer partners formulate sustainability goals for the respective transfer activity. These goals, which are in the public interest, are normative statements that are not based on scientific research. Nevertheless, scientific arguments can be made, for example, with reference to transdisciplinary sustainability research or ESD. There are two possible approaches to developing sustainability goals. On the one hand, the transfer partners themselves can develop sustainability goals for their specific transfer activity. The reference point can be the transfer actors' understanding of sustainability, which can be seen, for example, in sustainability guidelines, sustainability statements, or societal positioning. On the other hand, externally defined sustainability goals, such as the SDGs, the goals of the German Sustainability Strategy, or goals specific to a certain area, e.g., of the energy transition, can be included. These goals have the advantage that they are accepted by society and have usually been tested from a scientific standpoint. However, they generally have to be incorporated into operations for concrete transfer activities. The discussion of sustainability goals

between the transfer partners can culminate in a rationale for the goals, showing the extent to which a contribution to sustainable development can or should be made.

Second, the sustainability impact is of great relevance. However, capturing, let alone measuring, these effects is difficult because in complex, real-world situations it is difficult to clearly attribute impacts, because cause–effect relationships are hard to distinguish from other environmental influences and effects can be delayed, shifted regionally and functionally, and can also have (unwanted) side effects [40]. The formulation of sustainability goals is a starting point for capturing the effects, because criteria can be derived from the goals to evaluate the success or failure of transfer activities. For this purpose, various approaches are proposed in the literature, e.g., balancing model [1]; result types [41]; impact forms and effectiveness [39]; impact logic as diagram of a causal model [42].

Third, minimum and exclusion criteria for sustainability transfer can be formulated. In the interest of socially responsible research [19], the results of the transfer activities should be freely accessible, especially if the activities carried out by the university are part of a public contract or are financed with public funds (minimum criterion). Furthermore, the transfer activities may not conflict with sustainable development or cause or exacerbate sustainability problems. The SDGs can serve as a point of reference. If the transfer activity endangers the achievement of individual goals, then it is not sustainability transfer (exclusion criterion). In view of the internal inconsistencies of the SDGs, it will be necessary to strike a balance.

Focal Areas of Sustainability Transfer

The focal areas can be divided into research, teaching, and the third mission. According to the definition of [1], sustainability transfer in the third mission refers to those university activities that go beyond the compulsory tasks in teaching

and research but are related to them. This then includes all third mission activities that make or aim to make a contribution to sustainable development. In contrast to this, sustainability transfer is explicitly linked with teaching and research here and in line with [5]. The decisive factor is the existence of practitioner–university collaborations in these areas of focus, as shown in Figure 1.

Sustainability transfer in research is only briefly described here. It focuses on a joint process of practical application and implementation, which is mutually supported by practitioners and university actors and which is intended to contribute to the solution of specific sustainability problems. This is therefore a sub-aspect of transdisciplinary sustainability research. Specific to sustainability transfer is the link to practical application, i.e., a test, trial, implementation in practice, for which the transfer partners jointly assume responsibility in the form of co-implementation. Since this is a real context, the practical benefit and success of the implementation is extremely important; the university actors cannot pursue their scientific knowledge interests on their own, potentially at the expense of successful implementation [5]. Another benefit for the actors involved is shared evaluations or even a joint reflection process, which can reinforce the learning effects for all participants.

In the transfer of sustainability in teaching, practitioners are involved in students' learning processes on sustainability. For example, practitioners report on their work, there are practical tasks, the real world is a place of learning, and students and practice partners work together on sustainability problems. The spectrum ranges from practitioners who come to the lecture hall to the incorporation of teaching in a practical setting.

Sustainability transfer in teaching can be based on the concept of ESD, which supports a clear sustainability focus [23,28].

The incorporation of practical experience strengthens the focus on competencies in particular, which in the case of ESD is aimed at acquiring competencies for influencing the societal impact.

The focus on competencies is promoted by learning in real-world situations because the social context of learning is real and is not a simulation in a lecture hall or seminar. Students shape the world and their environment and learn first-hand that they can make a personal contribution to shaping society, as the empirical study on student sustainability projects shows.

Didactic approaches are problem-based learning, research-based learning, and service learning. Examples are student projects and final theses with transfer partners, dual courses of study, internships, service learning, and involvement of transfer partners in teaching, and mentoring and coaching [14].

Transfer Actors

On the university side, the transfer actors include all university members. The non-university partners include companies and economic actors, policymakers, public administration, civil society organizations and initiatives, as well as citizens. Sustainability transfer is thus shaped by very different actors. Relevant groups of actors for teaching are outlined below.

Transfer in teaching can be unidirectional or reciprocal until the learning process and learning outcomes are reflected on together with the practice partners. Students, teachers, and external partners in practice are involved in the learning process. This can go as far as collaborative efforts to impact society as equal partners. By including practitioners, new teaching–learning contexts are created in which students themselves can become transfer actors [37].

Students put their subject-specific and methodological knowledge to practical use in a real or realistic context and develop an integrated approach to shaping the world they live in.

Practice partners contribute relevant practical problems and gain access to current, research-based knowledge through cooperation. These kinds of teaching partnerships can provide low-threshold access to scientific knowledge, especially for small organizations and initiatives. Practitioners can benefit from questions and suggestions from students and reflect on their activities from an analytical perspective, which is relevant, for example, for clarifying sustainability goals and priorities.

Teachers create the framework for this learning setting and manage the learning process and the associated communication in the form of learning coaches. They "translate" between students and practice. They can improve the quality of their teaching and gain insights into practical sustainability problems which they use as a basis to inspire teaching and research.

Phases of Sustainability Transfer

Sustainability transfer can ideally be outlined as a four-phase process, whereby considerable fluctuations are possible, and phases can overlap. "Typical" tasks and requirements can be allocated to each phase. This makes it possible to get an overview of possible courses of action, facilitates an analysis of the processes, and can show alternatives and options for action to further develop the planning of sustainability transfer. There are four distinct phases [43]:

• Initiation of transfer and identification of actors;

• Concept and goals of the transfer activity;

• Implementation of the transfer activity;

• Compilation and documentation of the results.

In the first phase of initiation, the challenge is to identify the theme and transfer partners for a specific class. The starting point can be problems from practical areas covered by the respective degree programs and modules. In a first meeting, the potential partners must assess the extent to which they agree on the transfer activity they want to undertake. On this basis, they can decide whether cooperation makes sense from their point of view, whether they fit together organizationally, and whether there is enough trust to engage in a joint learning process. Teachers often have the responsibility for this step.

The second phase of conceptual development involves planning the learning process and transfer activities. A suitable way of clarifying the content is to jointly agree on sustainability goals to be achieved in the learning process. Based on shared learning goals, a teaching–learning concept can be developed for which ESD offers a variety of approaches and suggestions for implementation, e.g., case studies, project work, internships, etc. It is important to bear in mind here that the learning processes in sustainability transfer are more open, more difficult for those involved to assess, and often involve a greater (time) investment for students and teachers. Nor can they always be smoothly integrated into curricula and examination regulations.

In the third phase of implementation, the task is to translate analysis, development, or testing of solution approaches into a learning process. The aim is to achieve a learning and development process that is as mutual as possible, in which theory and practice are linked, and scientific methods and concepts are applied. It is important to clarify roles in the various learning and working steps. The roles can change, e.g., students can be both learners and creators of ideas or teachers.

In the fourth phase of results compilation, learning outcomes and experiences are to be documented. Documentation forms the basis for making the sometimes interwoven learning processes transparent. From the teaching point of view, the formal examination is a core element in compiling results. Examination formats based on competencies can be used to compile the students' results in such a way that they can be further used by the practice partners.

Universal Tasks

Furthermore, two universal tasks are examined which are set as requirements for sustainability transfer across all phases.

The task of process management helps to support different groups of actors with different competencies and interests in their cooperation. Organizational structures provide the transfer partners with certainty and the necessary resources. Another task is the internal and external

Communication throughout the entire transfer process. It creates transparency of transfer activities and fosters a culture of cooperation. By comparing the tasks in the different phases and the real overall conditions for sustainability transfer, the possibilities, scope for impact, and potential, but also limits, in the implementation of sustainability transfer can be estimated.

As a second task, reflection can ensure the sustainability focus of transfer activities. Reflection plays a role in verifying and sharpening the sustainability focus of transfer activities; it helps to identify "blind spots" and side effects and to prevent risks. In addition, reflection in all phases can contribute significantly to the quality of the learning and knowledge production. Reflection can be undertaken separately by groups of actors, which is easier to implement. Joint reflection on the transfer process is more complicated but promises more knowledge gain. Through academically guided reflection, common insights and experiences can be identified

that go beyond the respective case-related and context-specific results and can lead to transferable insights and experiences. Particularly with regard to the complex challenges of sustainable development, reflection should explicitly incorporate values and emotions. This also applies to learning from mistakes and failures.

Degrees of Complexity of Sustainability Transfer

Sustainability transfer can be differentiated according to how complex the interaction between university and practitioners is. The differences do not imply any judgments; the levels each have advantages and disadvantages, as shown in Figure 2.

Figure 2. Degrees of complexity of transfer (own diagram).

Provision of knowledge: The basic form of transfer includes all cooperation between the university and external partners. In the foreground is a largely unidirectional transfer of knowledge, technologies, and ideas from university to practice. At its own initiative, the university provides societal actors with findings, knowledge, and products from teaching and research without getting feedback on societal needs and the impact from the practice partners. Such forms of transfer can be carried out with few resources and have a comparatively extensive coverage or reach many people, while the intensity of interaction is low. Examples are exhibitions, popular science and transfer publications, lectures, scientific training, science communication, or technology transfer in companies.

Interaction: The university actors strive to ensure that their transfer activities are effective in practice; this requires input and feedback loops from the practitioners to the university [44]. Universities survey the needs and problems in practice and try to determine, or at least estimate, the impact of a transfer. Reciprocal exchange between university actors and practitioners is thus a key characteristic. Examples are mutual problem descriptions for knowledge-based problem resolution or mutual evaluation of knowledge and technologies in the respective context of activity.

Co-production: If universities want to address sustainability problems and contribute to solving them, then joint knowledge production as equal partners makes sense. All transfer partners contribute their competencies, strengths, and perspectives to joint learning and research processes as part of co-production. Examples are joint problem descriptions, joint development of guiding principles and sustainability visions, and the development of transformative solutions (e.g., in real-world laboratories).

6. Discussion and Outlook: what does Sustainability Transfer Mean for Universities?

The definition of sustainability transfer provided, and the six descriptive characteristics enable such transfer activities to be systematically identified and described. Visibility can increase appreciation for this form of transfer. The descriptive characteristics also enable empirical analysis and comparison between different forms of sustainability transfer, which in turn allows a more precise positioning in the focal area of universities and increases the academic compatibility.

Nevertheless, the concept needs further specification regarding the distinction between transfer and the third mission. The traditional notion of transfer in the HEIs' context as unidirectional top-down process from university into practice and business regarding technology transfer is problematic. Analyses of transdisciplinary research show that the process of co-design and co-production is crucial when addressing real-world problems and having societal impact [45]. For this reason, it might be productive to speak of a fourth mission of co-creation for sustainability [6]. The context of knowledge generation and especially that

of adoption and implementation, the pick-up context, need further consideration with regard to transfer [40]. This implies a stronger focus on the perspective of practitioners.

Further, a more detailed consideration of the broad range of possible instruments and formats for transfer is preferable. In this regard, sustainability transfer can draw on experience with transdisciplinary concepts both from sustainability research and from ESD. For the latter, a service-learning model is an excellent example of how practitioners can communicate societal needs to university and how real-world problems can be integrated in teaching. In a service-learning model, students are expected to provide a direct community or social service that meets real community needs, while supporting purposeful civic learning [8]. Finally, the interviewees underline the usefulness of accepted forms of impact assessment for sustainability transfer that are still lacking.

In our estimation, sustainability transfer in teaching is already being carried out in some places at universities, without this being explicitly stated. By deliberately establishing a link to the concept of sustainability transfer, the potential, but also the limits, can be more clearly identified. In teaching, practitioner–university partnerships can enhance the practical focus of the degree programs, improve professional qualification of students, and support integrated competence orientation during studies [22]. Sustainability transfer can thus be a concrete implementation element of ESD.

The descriptive characteristics of sustainability transfer can be used to reflect on existing activities in teaching. The phases, the universal tasks, and the degrees of complexity help to position current or planned teaching activities and show very different starting points as well as development potential, which can be realized step by step.

Sustainability transfer is linked to a societal need. Students' learning and activities make a difference for society and the specific transfer partners. Students thereby become transfer actors in the context of sustainability and can make a contribution to society on behalf of universities [46]. In this way, sustainability transfer creates opportunities for the university to have an impact on society and to use its competencies in processes to shape society [5].

However, sustainability transfer in teaching depends on certain prerequisites. Resources such as time, space, and money are needed. Teaching concepts must be brought into line with university regulations, such as examination regulations, which requires flexibility on all sides. Moreover, transformative education and ESD are hardly incorporated structurally in teaching programs. There is a gap in HEIs' teaching concepts in Germany regarding ESD and educating change agents for sustainable development [47]. Nevertheless, HEIs are a highly appropriate place to train key competences for future change agents; and sustainability transfer in teaching is a promising approach that allows students to explore, test, experience, and reflect such key competences in a holistic as well as in a realistic way.

These aspects extend beyond sustainability transfer in teaching. In keeping with the whole institution approach, practitioner–university partnerships require that university actors communicate as coherently as possible with practice actors. Regarding the case study of sustainability transfer in teaching with a focus on regional sustainable development, different practitioners cooperate with different members of the HEI, at least with students and teachers, possibly also with researchers as disciplinary experts and representatives of the administration. In this situation, students have to navigate between scientific rigor and pragmatic real-world solutions. These points to the crucial

role of organizational culture in sustainability governance that enables and fosters consistent communication between diverse university actors. In this context, Niedlich et al. emphasize the importance of a holistic orientation based on the university's purpose and its concept of sustainability [48].

When HEIs open themselves up to a certain degree to practitioners and seize on new ideas, they are probably in a better position to contribute to sustainable development effectively. In turn, cooperation between practitioners and universities can have an impact on the internal activities of universities and even on their organizational cultures. One example for this are specific organizational interfaces between the university and practitioners that a reciprocal exchange, as well as communication and cooperation between heterogeneous members of HEIs, with regard to external relationships.

However, university transformation goes beyond organizational changes. Following a whole institution approach requires stimuli from the outside to trigger change within universities. This can also initiate alterations in the organizational culture, supporting a holistic orientation. This may enable a co-existence, an overlap, and a reinforcement of the different missions of HEIs [6]. In this sense, sustainability transfer can be understood as one element in sustainability transformation.

References and Notes:

1.Henke, J.; Pasternack, P.; Schmid, S. Third Mission bilanzieren. Die dritte Aufgabe der Hochschulen und ihre öffentliche; Kommunikation; HoF-Handreichungen 8; Institut für Hochschulforschung (HoF): Halle-Wittenberg, Germany, 2016.

2.Henke, J.; Pasternack, P.; Schmid, S. Mission, die dritte. Gesellschaftliche Leistungen der Hochschulen neben Forschung und Lehre: Konzept und Kommunikation der Third Mission; BWV—Berliner Wissenschafts-Verlag: Berlin, Germany, 2017.

3.HRK,Hochschulrektorenkonferenz. Füreine Kulturder Nachhaltigkeit. Empfehlungender 25. Mitgliederversammlungder HRK; Hochschulrektorenkonferenz Mitgliederversammlung: Lüneburg, Germany; Hochschulrektorenkonferenz: Berlin/Bonn, Germany, 2018.

4.Grunwald, A. Transformative Wissenschaft—eine neue Ordnung im Wissenschaftsbetrieb? GAIA - Ecol. Perspect. Sci. Soc.Soc. 2015, 24, 17–20. [CrossRef]

5.Schneidewind, U. Die "Third Mission" zur "First Mission" machen? Die Hochschule 2016, 1, 14–22.

6.Trencher, G.; Yarime, M.; McCormick, K.B.; Doll, C.N.H.; Kraines, S.B. Beyond the third mission: Exploring the emerging university function of co-creation for sustainability. Sci. Public Policy 2014, 41, 151–179. [CrossRef]

7. Brink, E.; Wamsler, C.; Adolfsson, M.; Axelsson, M.; Beery, T.; Björn, H.; Bramryd, T.; Ekelund, N.; Jephson, T.; Narvelo, W.; et al. On the Road to 'Research Municipalities': Analysing Transdisciplinarity in Municipal Ecosystem Services and Adaptation Planning. Sustain. Sci. 2018, 13, 765–784. [CrossRef] [PubMed]

8.Kricsfalusy, V.; George, C.; Reed, M.G. Integrating problem- and project-based learning opportunities: Assessing outcomes of a field course in environment and sustainability. Environ. Educ. Res. 2016, 24, 593–610. [CrossRef]

9.Papenfuss, J.; Merritt, E. Pedagogical Laboratories: A Case Study of Transformative Sustainability Education in an Ecovillage Context. Sustainability 2019, 11, 3880. [CrossRef]

10. Walk, H.; Luthardt, V.; Nölting, B. Participatory Learning for Transdisciplinary Science in Biosphere Reserves—A Modified Role for Universities. In UNESCO Biosphere Reserves: Supporting Biocultural Diversity, Sustainability and Society; Price, M., Reed, M., Eds.; Earthscan/Routledge: New York, NY, USA; Oxon, UK, 2020; pp. 297–307.

11. Wissenschaftsrat. Wissens- und Technologietransfer als Gegenstand institutioneller Strategien; pPosition Paper (Drs. 5665-16); Wissenschaftsrat: Cologne, Germany, 2016.

12. BMBF German Federal Ministry of Education and Research. Grundsatzpapier des Bundesministeriums für Bildung und ForschungzurWissenschaftskommunikation; BMBF: Berlin, Germany, 2019.

13. MWFK. Transferstrategie Brandenburg—Verbesserung der Zusammenarbeit von Wissenschaft mit Wirtschaft, Politik und Zivilgesellschaft; enacted by the cabinet on 5 September 2019; Ministry of Science, Research and Education of the Federal State of Brandenburg, Ed.; MWFK: Potsdam, Germany, 2017.

14. Roessler, I.; Duong, S.; Hachmeister, C. Welche Mission haben Hochschulen? Third Mission als Leistung der Fachhochschulen für die und mit der Gesellschaft; CHE gemeinnütziges Centrum für Hochschulentwicklung (working paper 182): Gütersloh, Germany, 2015.

15. Warnecke, C. Universitäten und Fachhochschulen im regionalen Innovationssystem. Eine deutschlandweite Betrachtung; RUFIS (Ruhr-Forschungsinstitut für Innovations- und Strukturpolitik e.V.): Bochum, Germany, 2016.

16. BMBF; German Federal Ministry of Education and Research. Nationaler Aktionsplan Bildung für nachhaltige Entwicklung. Der deutsche Beitrag zum UNESCO-Weltaktionsprogramm; BMBF: Berlin, Germany, 2017.

17. UNESCO United Nations Educational, Scientific and Cultural Organization. General Conference, Framework for the implementation of education for sustainable development (ESD); UNESCO, Ed.; beyond 2019: Paris, France, 2019.

18. Vogt, M.; Lütke-Spatz, L.; Weber, C.; Bassen, A.; Bauer, M.; Bormann, I.; Denzler, W.; Geyer, F.; Günther, E.; Jahn, S.; et al. Nachhaltigkeitsverständnis des Verbundprojekts HOCHN; Ludwig-Maximilians-Universität Munich: Munich, Germany, 2020.

19. Ferretti, J.; Daedlow, K.; Kopfmüller, J.; Winkelmann, M.; Podhora, A.; Walz, R.; Bertling, J.; Helming, K. Reflexionsrahmen für Forschen in gesellschaftlicher Verantwortung. BMBF-Projekt 'LeNa – Nachhaltigkeitsmanagement in außeruniversitären Forschungsorganisationen';Leibniz-Gemeinschaft, Helmholtz-Gemeinschaft, Fraunhofer-Gesellschaft: Berlin, Germany, 2016.

20. UNESCO United Nations Educational Scientific and Cultural Organization. Roadmap for Implementing the Global Action Programme on Education for Sustainable; UNESCO: Paris, France, 2014; Available online: https://unesdoc.unesco.org/ark:/48223/pf0000230514

21. National Platform. National Action Plan on Education for Sustainable Development. The German Contribution to the UNECSO Global Action Programme; UNECSO: Berlin, Germany, 2017; Available online: https://www.bneportal.de/sites/default/files/downloads/publikationen/BMBF_NAP_BNE_EN_Screen_2.pdf

22. Marcus, J.; Coops, N.C.; Ellis, S.; Robinson, J. Embedding Sustainability Learning Pathways across the University.

Curr. Opin. Environ. Sustain. 2015, 16, 7–13. [CrossRef]

23. Molitor, H. Education for sustainable development. In Humans in the Global Ecosytem. An Introduction to Sustainable Development; Ibisch, P.L., Molitor, H., Conrad, A., Walk, H., Mihotovic, V., Geyer, J., Eds.; Oekom Verlag: München, Germany, 2019; pp. 333–350.

24. Overwien, B.; Rathenow, H.-F. (Eds.) Globalisierung Fordert Politische Bildung, Politisches Lernen im globalen Kontext; Farmington Hills: Opladen, Germany, 2009.

25. Rieckmann, M. Key themes in Education for Sustainable Development. In Issues and trends in Education for Sustainable Development; UNESCO: Paris, France, 2018; pp. 61–84.

26. Konrad, T.; Wiek, A.; Barth, M. Embracing conflicts for interpersonal competence development in project-based sustainability courses. Int. J. Sustain. High. Educ. 2020, 21, 76–96. [CrossRef]

27. Rieckmann, M. Learning to transform the world: key competencies in Education for Sustainable Development. In Issues and trends in Education for Sustainable Development; UNESCO: Paris, France, 2018; pp. 39–58.

28. Bellina, L.; Tegeler, M.K.; Müller-Christ, G.; Potthast, T. Bildung für nachhaltige Entwicklung (BNE) in der Hochschullehre (Betaversion); BMBF-Projekt 'Nachhaltigkeit an Hochschulen: Entwickeln - vernetzen – berichten (Hoch-N): Bremen/Tübingen, Germany, 2018.

29. Kates, R.W.; Clark, W.C.; Corell, R.; Hall, J.M.; Jaeger, C.C.; Lowe, I.; McCarthy, J.J.; Schellnhuber, H.J.; Bolin, B.; Dickson, N.M.; et al. Sustainability science. Science 2001, 292, 641–642. [CrossRef] [PubMed]

30. Defila, R.; Di Giulio, A. (Eds.) Transdisziplinär forschen – Zwischen Ideal und Gelebter Praxis. Hotspots, Geschichten, Wirkungen; Campus Verlag: Frankfurt, Germany; New York, NY, USA, 2006.

31. Lang, D.; Wiek, A.; Bergmann, M.; Stauffacher, M.; Martens, P.; Moll, P.; Swilling, M.; Thomas, C.J. Transdisciplinary research in sustainability science - practice, principles, and challenges. Sustain. Sci. 2012, 7, 25–43. [CrossRef]

32. Schneidewind, U.; Singer-Brodowski, M. Transformative Wissenschaft. Klimawandel im deutschen Wissenschafts- und Hochschulsystem, 2nd ed.; Metropolis: Marburg, Germany, 2014.

33. WBGU, German Advisory Council on Global Change. World in Transition—A Social Contract for Sustainability; Flagship Report; WBGU Secretariat: Berlin, Germany, 2011.

34. Wanner, M.; Hilger, A.; Westerkowski, J.; Rose, M.; Stelzer, F.; Schäpke, N. Towards a Cyclical Concept of Real-World Laboratories. disP - Plan. Rev. 2018, 54, 94–114. [CrossRef]

35. Nölting, B.; Dembski, N.; Dodillet, J.; Holz, J.; Lehmann, K.; Molitor, H.; Pfriem, A.; Reimann, J.; Skroblin, J.-H. Transfer stärkt Lehre. Wie Nachhaltigkeitstransfer Hochschullehre inspirieren kann; HNEE (HOCHN discussion paper at HNE Eberswalde); No. 01; Eberswalde University for Sustainable Development: Eberswalde, Germany, 2018.

36. Gläser, J.; Laudel, G. Experteninterviews und Qualitative Inhaltsanalyse als Instrumente Rekonstruierender Untersuchungen, 4th ed.; VS Verlag für Sozialwissenschaften: Wiesbaden, Germany, 2010.

37. Reimann, J. Nachhaltigkeitstransfer an Hochschulen und der Beitrag für eine nachhaltige Regionalentwicklung – Die Rolle von Studierenden in Projektarbeiten zur Regionalentwicklung; HNEE: Eberswalde, Germany, 2019.

38.Wiek, A.; Withycombe, L.; Redman, C.L. Key competencies in sustainability: A reference framework for academic program development. Sustain. Sci. 2011, 6, 203–218. [CrossRef]

39.Krainer, L.; Winiwarter, V. Die Universität als Akteurin der transformativen Wissenschaft. GAIA 2016, 25, 110–116. [CrossRef]

40.Nagy, E.; Ransiek, A.; Schäfer, M.; Lux, A.; Bergmann, M.; Jahn, T.; Marg, O.; Theiler, L. Transfer as a reciprocal process: How to foster receptivity to results of transdisciplinary research. Environ. Sci. Policy 2020, 104, 148–160. [CrossRef]

41.Kaufmann-Hayoz, R.; Defila, R.; Di Giulio, A.; Winkelmann, M. Was man sich erhoffen darf – Zur gesellschaftlichen Wirkung transdisziplinärer Forschung. In Transdisziplinär forschen – zwischen Ideal und gelebter Praxis. Hotspots, Geschichten, Wirkungen; Defila, R., Di Giulio, A., Eds.; Campus Verlag: Frankfurt, Germany; New York, NY, USA, 2016; pp. 289–327.

42.Kurz, B.; Kubek, D. Kursbuch Wirkungen. Das Praxishandbuch für Alle, die Gutes Noch Besser tun Wollen, 3rd ed.; PHINEO gAG.: Berlin, Germany, 2015.

43.Nölting, B.; Dembski, N.; Kräusche, K.; Lehmann, K.; Molitor, H.; Pape, J.; Pfriem, A.; Reimann, J.; Skroblin, J.-H.; Walk, H. Transfer für Nachhaltige Entwicklung an Hochschulen; HNEE: Eberswalde, Germany, 2018.

44.Bormann, I. Zwischenräume der Veränderung. Innovationen und ihr Transfer im Feld von Bildung und Erziehung; VS Verlag für Sozialwissenschaften: Wiesbaden, Germany, 2011.

45.Lux, A.; Schäfer, M.; Bergmann, M.; Jahn, T.; Marg, O.; Nagy, E.; Ransiek, A.-C.; Theiler, L. Societal effects of transdisciplinary sustainability research - How can they be strengthened during the research process? Environ. Sci. Policy 2019, 101, 183–191. [CrossRef]

46.Singer-Brodowski, M. Studierende als GestalterInnen einer Hochschulbildung für Nachhaltige Entwicklung. Selbstorganisierte und Problembasierte Nachhaltigkeitskurse und ihr Beitrag zur Überfachlichen Kompetenzentwicklung Studierender; Berliner Wissenschafts-Verlag: Berlin, Germany, 2016.

47. Etzkorn, N.; Singer-Brodowski, M. Verankerung von Bildung für nachhaltige Entwicklung im Bildungsbereich Hochschule. In Wegmarken der Transformation. Nationales Monitoring von Bildung für nachhaltige Entwicklung in Deutschland; Brock, A., Haan de, G., Etzkorn, N., Singer-Brodowski, M., Eds.; Verlag Barbara Budrich: Berlin, Germany; Toronto, YTO, Canada, 2018.

48.Niedlich, S.; Kummer, B.; Bauer, M.; Rieckmann, M.; Bormann, I. Cultures of sustainability governance in higher education institutions: A multi-case study of dimensions and implications. High. Educ. Q. 2019, 5, 1–18. [CrossRef]