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Original Article

Mainstreaming Education for Sustainable Development at a Swiss University: Navigating the Traps of Institutionalization

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How far have higher education institutions progressed towards integrating sustainable development at an institutional level and are they responding to the societal need for transformation? Can the pace of transformation be accelerated, given the urgency of the issues our world is facing? As a practice-oriented contribution to this broader debate — still open despite progress achieved during the Decade of Education for Sustainable Development (2005–2014) — this article discusses a mainstreaming strategy applied to teaching at a higher education institution in Switzerland, the University of Bern. We analyse the traps of institutionalizing sustainable development (SD) in a higher education institution and clarify the policies and approach to change management needed to navigate these traps, based on an analysis of our experience as an education for sustainable development team. We propose (1) using a combined top-down and bottom-up policy to increase motivation, (2) prioritizing and sequencing target groups and helping them to find the link between their discipline and SD, and (3) offering tools, support, and professional development to help lecturers to move towards a more competence-oriented form of teaching. Concrete support needs to take place at four levels: the level of formulating competences for SD; the level of shifting towards a learner-centred approach; the level of designing their learning environments; and the level of becoming a community of practice. An impact chain explains the logic from concrete activities (tools, courses, workshops, etc.) to the desired impact of helping lecturers and graduates to become agents of change capable of playing a key role in society and helping to shape our future.
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Introduction

Sustainable development (SD) requires a value-conscious, pan-societal process of transformation (WBGU, 2011), implying, among others, that individuals are willing to change and have appropriate knowledge and skills for participating in or leading change (Corcoran *et al.*, 2002; Luna *et al.*, 2012). Education plays a significant role in supporting this process of transformation, since the role of education can be to prepare the new generation to be "change agents" (WBGU, 2012). The key role of education in pursuing more *sustainable* development has long been acknowledged by the global community, for example in Chapter 36 of Agenda 21 (UN, 1992), the Decade of Education for Sustainable Development (2005–2014) and subsequent plan of action (UNGA, 2017), and Goal 4 of the Sustainable Development Goals (UN, 2015). A key means of achieving this goal is to advance policy — "a foundational activity for education for sustainable development and the one in which the greatest number of key partners are engaged. Education systems are increasingly informed by education for sustainable development strategies, guidelines and frameworks" (UNGA, 2017, 9). But although policy has advanced, adaptation of curricula to integrate SD has been slow, especially in higher education institutions (Sule and Greig, 2017).

How do higher education institutions (HEIs), in particular universities, serve society through education and are they in a position to help to transform our world towards SD? This is a major institutional challenge for HEIs (Tilbury, 2013), which have to transform themselves if they want to contribute to transformation (COPERNICUS Alliance, 2012). Universities have institutional structures that do not readily allow for change of the kind needed for transformation. To quote a recent essay on transformation, "it should be discussed in what sense these governance structures are part of the problem" (Brand, 2016, 25). This is what Trowler *et al.* (2013) examine from the perspective of organizational change. They look at what hinders change at universities and mention very slow internal structures, difficult decision-making processes because they take place at numerous and uncoordinated levels, and problems in implementing new practices. But they also underline that from a historical perspective, these structures have enabled universities to survive, sometimes across many centuries, and point out that universities are therefore also "adept at adapting" (273) rather than being just "change averse" (272). Universities adapt to some changes while maintaining and constantly supporting historically developed structures, so the picture is not so bleak. But do universities respond to societal needs or are they ivory towers?

Research on organizational change in HEIs has explored what enables them to adapt to societal needs. In their extensive review of articles discussing the nature of organizational change studies within HEIs, Fumasoli and Stensaker (2013) argue that structures, processes, and organizational cultures(s) reflect complex dynamics and interactions between internal and external factors. While it is important to see

how HEIs handle external influences, it is also important to understand internal dynamics. The authors note that power relations have been well researched in this context, but that the organizational influence on the content and practices of teaching (and research) is less known. This is regrettable, given the importance teaching must have in the vision of universities contributing to the transformation towards SD (Kläy, 2012). Indeed, assuming that only a minority of university students will work in research after graduation, the question arises how HE can best prepare the majority of students who could become key players for SD in numerous other workplaces. Of course, ensuring that the minority who will continue working as academics are able to adapt to new forms of research is just as important and requires action as well. From the perspective of Agenda 2030 (UN, 2015), it is essential to ensure that universities offer conditions for teaching and learning that make education for sustainable development (ESD) possible (Verhulst and Lambrechts, 2015).

Although teaching is a key priority for universities, assessments and rankings tend to privilege research, with a focus on publication and citation activity (Fadeeva and Mochizuki, 2010; Wals, 2014); moreover, professional development in tertiary teaching is seldom a requirement when appointing new professors, at least in Switzerland. This makes it difficult to create better conditions for ESD at most universities. An additional barrier needs to be tackled once the conditions for teaching have been improved: the dominant understanding of teaching in HEIs is that the aim of teaching is to transmit scientific knowledge and skills rather than to enable students to develop competences (Sterling and Thomas, 2006). This is remarkable given the fact that European universities should meanwhile be implementing the Dublin descriptors, which focus not only on knowledge but also on various other skills and competences (swissuniversities, 2017). The focus on knowledge transmission alone has long been shown to work against the aims of ESD (Ison, 1990).

Thus, if we want universities to contribute to transformation towards more SD, we need them to be responsive to this societal need. This responsiveness will depend on their management's ability to rethink the role of education and to create a favourable environment for learning for change. The nature of and conditions for teaching need to be reconsidered in order for teaching to be able to support the development of competences for SD. In this article, we explore how a Swiss university used the momentum provided by the national and regional political context on the one hand (Kläy, 2012), and by a federal programme to support better integration of SD at universities on the other (scnat, 2017), to try and mainstream SD in teaching in all its faculties.

Our aim is to discuss what is necessary for a successful integration and mainstreaming of SD into education at university, in particular:

- What policies are needed?

- Which university members should be involved when?
- And how can these members be supported?

Based on a conceptual framework illustrating our own theory of change, we analyse the example of the University of Bern's approach to mainstreaming SD in teaching, discuss it in the context of the international literature, and draw conclusions regarding how the traps of institutionalizing SD in a university can be navigated through a combined top-down and bottom-up policy, with specific attention paid to prioritizing of target groups and sequencing of interaction with them, and the development of a set of tools and support approaches.

Conceptual Framework

Designing an impact chain for mainstreaming SD in teaching

Our conceptual framework for analysing the experience of the University of Bern is based on monitoring theory (Bickmann, 1987). Its basic premise is to develop a "theory of change" that starts from a formulation of *desired impacts* (Ebrahim and Rangan, 2014, 124). From there, it is possible to derive *impact hypotheses* and formulate an *impact chain.* The impact chain is an application of the theory of change to a very concrete context. The impact chain consists of *desired outcomes*, which are postulated as the expected broader effects of the *outputs* of planned activities. While outputs can be planned, their use and usefulness depends on stakeholders involved and can only be verified years after implementation of planned activities (Fig. 1): they are subject to an "attribution gap". In addition to reflecting on outputs, outcomes, and impacts, it is important to think about *who* will be involved in change and *what context and factors* will help to make change more likely (Herweg and Steiner, 2002). It is also worthwhile differentiating between desirable and undesirable impacts and outcomes, and being aware of factors that could influence outcomes in unexpected ways.

In the case of designing how a university can contribute to SD, the *first step* is thus to define the desired impact — a university that contributes to "transformation". Based on Stoltenberg and Burandt (2014), we define transformation towards SD as a continuous global, societal, and democratic search and learning process aimed at shaping alternative pathways. SD is a moving target in a world with fast changing needs and dwindling natural resources. To be able to move towards SD, we need change agents capable of generating knowledge to understand the world, and able to help to define the (moving) target and negotiate the ways in which we can reach it (Proclim/CASS, 1997). What are the expected outcomes that need to be achieved within the context of university teaching, given the fact that the desired impact consists of a moving target on the one hand, and on the other, of individuals capable of helping society at large to reach it?

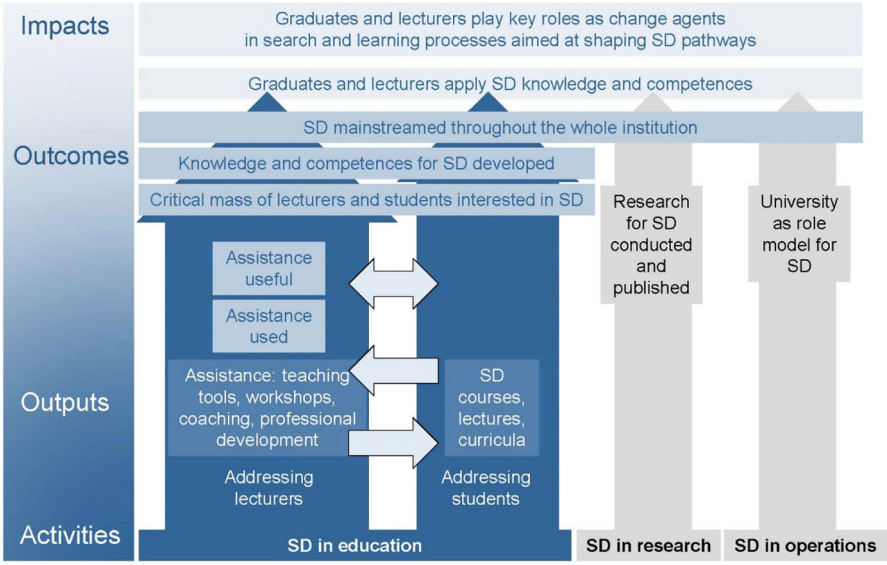

Fig. 1. Model of an impact chain as a conceptual framework for imagining how a university can start integrating sustainable development (SD). Design by Karl Herweg.

Before we can define what the desired outcomes are, in a *second step* we need to better understand who will be the change agents. In a larger societal context, anybody who wants to contribute to transformation can become a change agent (Schubiger, 2013); within the context of tertiary education, the potential change agents will be university graduates and the lecturers who teach them. The problem is that such an understanding of students and teachers in HE runs counter to the conventional understanding of teaching at a university; but as Wals and Jickling (2002) argue, "higher education has first and foremost something to do with creating possibilities, not defining or prescribing the future for our students" (130). Part of creating these possibilities is to enable students to become change agents, and enable teachers to help them to achieve this. An important question to reflect on when doing this is how intensively HE should involve students in transformative learning (Singer-Brodowski, 2016): should it "only" enable students to think critically and reflexively, or can it go further and require more, in view of the urgency of SD and a generally weak link between knowledge and action? The decision is an ethical one.

A *third step* is to work out how much resistance can be expected from the university and how we can reach lecturers and students to support transformation towards SD — in other words we need to grasp the context. As an institutional body, a university system will attempt to be "sustainable" by sustaining its

structures; paradoxically, this leads to inertia and lack of responsiveness to societal needs. But at the same time, it is necessary for the university to offer reliable working conditions to its staff. Therefore, it is essential to understand a university's structures and work with them rather than against them, and to identify where there are possibilities of introducing change and making existing structures support change (Verhulst and Lambrechts, 2015).

This leads us to the *fourth step*, describing desired outcomes. The first outcome would logically be to reach as many students and teachers as possible, and ensure that they acquire the knowledge and competences to understand SD and link this knowledge to action. Offering university lecturers guidance in their attempt to take SD into account in their teaching is a way of doing this (Barth and Rieckmann, 2012), along with providing support for students willing to engage for SD (Sterling and Witham, 2008). Another important outcome would be an institutionalization of this reorientation and enrichment of teaching, for which professional development and a change in assessment criteria are essential (Mader, 2014); moreover, it is essential to enable teachers to become multipliers (Barth and Rieckmann, 2012).

The *fifth and final step* is to conceive outputs and activities that can lead to these outcomes. A number of researchers and practitioners have reached agreement on the need, ultimately, for transformative learning (Singer-Brodowski, 2016; Sterling, 2011), but have also pointed out that such learning is difficult to stage at a university (e.g. Moore, 2005). Therefore, being aware of options to integrate SD into teaching in stages rather than revolutionizing the entire tertiary education system has been recommended as the way to go (Sterling and Thomas, 2006). This requires delving deeper into what kind of teaching is needed to enable our students to become change agents.

Moving towards competence-oriented and learner-centred teaching

Learning scenarios must be designed in a way that enables students to develop the competences that are needed for SD (UNECE, 2011). Competences have generally been defined as the "proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations" to perform a specific task (EC, 2009, 14). Several suggestions have been made to define SD-specific competences (e.g. de Haan's, 2010, model of competences for ESD; the skills significant for ESD identified by Dawe *et al.*, 2005; the sets of values, knowledge, understanding, and abilities developed at RMIT University, described in Holdsworth *et al.*, 2006; the analysis of sustainability competences specifically needed in the academic context, see Wiek *et al.*, 2011). According to Sterling and Thomas (2006), these suggestions have two things in common: first, they should be viewed as a guide and must be modified by teachers to suit their own discipline and teaching needs. Second, they "require the introduction of a much more critical and interactive pedagogy than usually found in universities" (352). Tilbury (2011) also

Table 1 Major shifts in higher education required to integrate sustainable development (SD)

Integration of sustainability within higher education implies shifts:	
From	*To*
Transmissive learning	Learning through discovery
Teacher-centred approach	Learner-centred approach
Individual learning	Collaborative learning
Learning dominated by theory	Praxis-oriented learning linking theory and experience
Focus on accumulating knowledge and a content orientation	Focus on self-regulative learning and a real issues orientation
Emphasis on cognitive objectives only	Cognitive, affective, and skills-related objectives
Institutional, staff-based teaching/learning	Learning with and from outsiders
Low-level cognitive learning	Higher-level cognitive learning

Table reproduced from Sterling (2004, 58, Table 4.3, courtesy of the author)

calls for more active and participatory learning, and Herweg and Moser (2017) suggest the need for self-directed and problem-based learning in interdisciplinary teams. We must therefore challenge the widely used conventional teaching style and change our ways of teaching. Sterling (2004) summarizes this in a table showing major shifts (Table 1).

One of the core claims made by Sterling (2004) is the shift towards a learner-centred approach, where universities exist not just to provide information but to induce learning. Barr and Tagg (1995) named this the "Learning Paradigm", where a university's purpose is to "create environments and experiences that bring students to discover and construct knowledge for themselves, to make students members of communities of learners that make discoveries and solve problems" (15). According to Hattie (2009), who conducted an analysis of 800 meta-analytical studies of learning impact (covering over 50,000 studies), this shift from teaching to learning and most of the other claims (e.g. the focus on self-regulative learning, learning with and from others) not only enable integration of sustainability within HE, but also increase the sense of empowerment that students experience through their proven increase in achievement. Hence, herein lies the possibility not only to strengthen ESD, but also to improve the learning outcomes of every student.

These shifts are crucial suggestions, but one should not try to initiate them all at the same time. This would make changes in curricula too complex for most teachers and would probably also lead to structural resistance within the institution, which needs to ensure that degrees are comparable among universities (EC, 2009). Table 1 provides teachers with ideas and directions about how and how extensively they might begin to change their teaching. To provide a more in-depth analysis of different possibilities of shifting towards ESD, Sterling (2011) describes three *orders of learning*. What characterizes the move from the first to the third order of

learning is an increasing focus on the process of learning rather than on the content of what is learned. Third-order learning is also called transformative learning. One of the purposes of transformative learning is to change the way we see ourselves and the world we live in Mezirow (2003). Transformative learning relies on a constructivist view of knowledge and learning, in which learning is conceived as an active rather than passive process: learners have an active role in constructing knowledge and meaning based on their experiences (Narayan *et al.*, 2013).

The *first level of learning* includes learning within existing disciplinary boundaries and is therefore *conformative*. Students learn to do things better, to be more effective and efficient. *Second-order learning* focuses on an active confrontation of values and assumptions. It involves the learner in critical examination, and if necessary in changing beliefs, values, and assumptions (Sterling, 2011). *Third-order learning* is a dramatic change. It deals with the "experience of seeing our worldview rather than seeing with our worldview" (Sterling, 2011, 22). It implies a "deep structural shift in the basic premises of thought, feelings and actions. It is a shift of consciousness that dramatically and permanently alters our way of being in the world" (Morrell and O'Connor, 2002, xvii).

Second-order learning and third-order learning are particularly important for ESD. At the same time, they are challenging — not only for students, because they involve reflecting and/or restructuring of basic assumptions and ultimately linking knowledge to action, but also for teachers, as it is difficult to design learning experiences that enable such learning (Sterling, 2011). This implies that teachers at universities willing to introduce SD into their teaching need support…

1. … when they formulate the competences for SD that students should acquire in their course;
2. … when shifting their teaching towards a more learner-centred approach; and
3. … when designing the specific learning environments that enable students to develop the desired competences.

Corresponding tools and methods have started to emerge at various universities and experience can be shared thanks to networks and publications. But only a minority of university teachers will know how to implement ESD. If a university applies a mainstreaming approach, it will also be necessary to provide professional development in addition to tools. According to a recent study conducted in over 33 countries (Mulà *et al.*, 2017), there is still a lack of capacity to integrate ESD in professional development and a lack of professional development in this field.

Despite numerous achievements during the Decade of Education for Sustainable Development, it remains a great challenge to provide teaching staff at HEIs with appropriate teaching practices and innovative learning scenarios. Research conducted by Holdsworth *et al.* (2008) and Tilbury (2016), the latter in connection

with the European programme "University Educators for Sustainable Development" (UE4SD), has revealed that it is still unclear what are the best forms of integrating SD into teaching and learning frameworks, and what are desired changes in professional development in HEIs. The UE4SD programme promotes a set of competences that help teachers to hone their focus on ESD. The authors also emphasize that a long-term perspective is needed to integrate this into professional development at universities (Mulà *et al.*, 2017).

The example of the University of Bern

The University of Bern's Strategy 2021 formulates a vision of a whole-university approach by including SD in teaching, research, and operations (Universität Bern, 2013). Implementation of this vision is relatively young and will require a number of years to permeate all areas of the university's activities. In this paper, we focus on how lecturers are being addressed (see Fig. 1, large pillar on the left) and how learning scenarios are leading to greater interaction with engaged students. As recommended by Chalkley and Sterling (2011), ideally each scientific discipline should be perceived as contributing to the societal goal of SD, as formulated in the "discipline leads" idea. This is the approach taken by the authors of the present article — an ESD team that is supporting the Rectorate in its efforts to mainstream SD in teaching. In the following section, we report on how we have been navigating the traps of institutionalizing SD and analyse our experience in the light of the literature.

How We Navigate Three Traps

What policies are needed?

Universities are historically grown institutions characterized by clear and powerful hierarchies; from this, one could deduce that a top-down approach to integrating SD into operations, research, and teaching is the right solution. At the same time, universities defend academic and teaching freedom, and are a key source of innovation. So is a top-down approach a trap? And how does one deal with it? The following analysis of the University of Bern's experience illustrates the issues involved in this question.

In a way that is exemplary for Switzerland, SD has been included in the University of Bern's performance mandates since 2010. This led the Rectorate of the University to integrate SD in its Strategy 2021, based also on an internal report of the University's Committee for SD, who was asked to conduct a survey in 2010 to see where SD was anchored and what still needed to be done. The Strategy 2021 paved the way for implementing integration of SD on a larger and deeper scale, as it provided the necessary policy conditions for introducing a new focus and a value

orientation that is sometimes reflected sceptically by academics (Kläy *et al.*, 2015). But this did not guarantee success of integration efforts, as the eight highly diverse Faculties have an institutionally enshrined freedom in the fields of research and teaching that had to be respected. Meanwhile, however, the Rectorate of the University had also decided to create interdisciplinary Centres covering five focal points of relevance to society, one of which was sustainability. The Centres receive four-year mandates from the University Rectorate and collaborate with institutes at various Faculties, following the principle of interdisciplinarity. This makes the Centres accountable to the Rectorate, but leads them to build alliances with the Faculties. The Centres thus have a rather special position in the University that makes them good candidates for negotiating the difficult interface between accountability to the overall strategy (and ultimately to society), freedom in research and teaching, and excellence in research. The Rectorate conducts annual "strategy and quality control discussions" with the nine Centres and eight Faculties, who then report to their institutes and departments. The former have the responsibility of adapting their planning to take into account the Rectorate's recommendations. Integration of SD is only a small part of these discussions, and it is difficult to ensure that the response in terms of concrete initiatives to make changes to existing structures will be fruitful: the impact of the top-down strategy tends to peter out when it reaches this level.

While a top-down policy is needed and can be essential in helping universities wherever there is a tendency towards institutional "change averseness" (Trowler *et al.*, 2013, 272) against SD, a bottom-up approach is just as essential. Indeed, integration of SD at universities requires both institutional change and personal commitment (Jones *et al.*, 2008; Lozano, 2006). Personal commitment is a challenge that is different from freedom of research and teaching; but one can argue that it is related if we understand freedom in the Enlightenment sense, as is often done in relation to SD. At the University of Bern, we are applying a strategy combining top-down and bottom-up efforts to integrate SD into teaching. On the one hand, the University Rectorate is requiring the integration of SD into all curricula through a top-down approach, based on the overall mandate from the regional government (which has derived the mandate from Switzerland's constitution). On the other hand, with the help of the ESD team (i.e. the authors of the present article) affiliated with one of its Centres and the University's Educational Unit, it is offering support to those willing to spearhead change. Moreover, the Rectorate is supporting bottom-up initiatives proposed by students and individual lecturers. But this comes with another kind of challenge, as pointed out by Thomas (2004): it "makes it difficult for top management to direct change, since guiding a group of academics who prize their individuality, analytical skills and creativity is not unlike 'herding a mob of cats'" (40).

Nevertheless, some change is taking place. This corresponds to what Fumasoli and Stensaker (2013) have observed from the perspective of organizational studies:

they see the university as an open system in a dynamic interrelation with its environment, which can be captured better while focusing on a bottom-up perspective. So do Trowler *et al.* (2013): in their view a university needs to be considered as a complex system that is not only steered by top-down approaches, but also by all individuals from the bottom-up. Interaction, a multi-level dialogue, and an iterative process are essential. While disciplinary independence is crucial and necessary for researchers' specialization, at the same time it can be a barrier to integrating SD.

In addition to the combined top-down and bottom-up approach, what other policy elements are needed to achieve the integration of SD within a university? Trowler *et al.* (2013) focus on institutional change towards a Sustainability Agenda and emphasize the need for change management within universities. The danger of creating bubbles of social practices that are not accessible to others must be avoided by having adaptable and flexible frameworks, different strategies to foster change, and long-term time frames to implement SD. This is often challenged by limited funding. The Rectorate of the University of Bern is providing a long-term perspective: it has been offering support and competitive funding since 2013. It has encouraged many projects and is providing the ESD team with a long-term time frame bound to the Strategy 2021. This has enabled the ESD team to develop guidelines and tools (see below, "How can they be supported?") to reach as many university staff as possible (see below, "Which university members should be involved when?"). The University also engages in a dialogue with faculty members at all levels, as well as with a national and international ESD network and with society. Broader interaction is achieved, for example, on the occasion of the annual Sustainability Day, the purpose of which is to promote dialogue within the University of Bern, as well as with other Bernese HEIs and society. Students and university staff are encouraged to present their visions of SD in concrete projects, where they act as a part of society; they transfer their knowledge and visions of SD into their daily lives — a key part of a strategy towards the whole-institution approach (Sterling and Thomas, 2006).

Which university members should be involved when?

Thinking carefully about how to increase the impact of efforts to reach teaching staff (and students) at the University of Bern is crucial. We strongly believe that everyone needs to do something to contribute to SD and that the job should not be delegated. So we could argue that "everyone must be involved in SD". This, however, will not work at a university — it contradicts the very principle of freedom and responsibility. This trap can be avoided by changing the verb "must" to "can" and offering teachers the help they need to integrate SD into their teaching.

If we want to reach all students, we need to put particular effort into assisting lecturers to integrate SD within their discipline. However, it is also very important

to consider that most university staff, trained mainly to do research and employed as researchers and teachers, are facing increasingly time-consuming tasks related to publishing, personnel and financial administration, quality management, dealing with important topics such as gender, etc. Thus, any additional task such as including SD into their work comes as an overload; it is crucial to find ways of overcoming this barrier. As different academic staff (the proverbially un-herdable "cats") have different knowledge and motivations, we divided them into four categories (Fig. 2) and set priorities regarding when and how to approach them. The four categories correspond to different barriers that must be tackled.

1. The group that is already "on board" needs to be acknowledged and supported by giving them the opportunity to share their knowledge, skills, insights, and questions. We made this happen by organizing an Early Adopter workshop and offering an electronic platform for exchange. We also invited early adopters to contribute to a volume of good practices (Fischer *et al.*, 2016).
2. The group that has to "establish thematic-methodological links" needs to be identified through a targeted communication strategy. After screening all courses on offer at the University, we invited selected university lecturers to attend a "find the link" workshop series, in which the ESD team helped teachers to establish links between their discipline and SD.

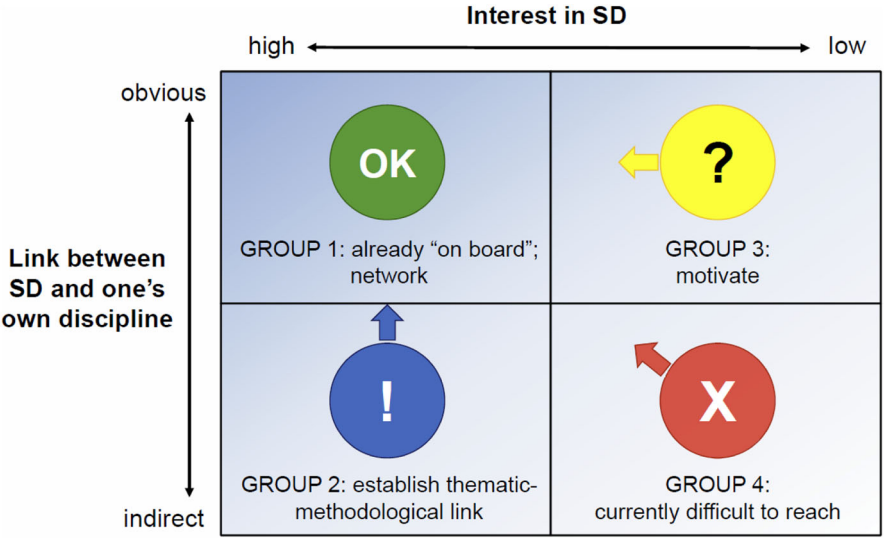

Fig. 2. Integrating sustainable development (SD) into university teaching: setting priorities.

3. By actively involving many academic staff in sustainability events such as the annual Sustainability Day, the team is trying to motivate lecturers and other University members by stimulating their interest in the field of SD.
4. We must be realistic about the group of people "currently difficult to reach": in the short term, we cannot convince lecturers who are not interested in SD or believe this does not concern them as researchers and teachers. They may eventually be reached by colleagues ("multipliers") capable of showing that integrating SD in their work can be a source of innovation.

Thus, the strategy of our team is to focus on gradually building a critical mass of motivated persons who are willing to take on the challenge of integrating SD into their teaching (groups 1 and 2). Sustainability events have begun to attract members in group 3. The Rectorate has a new policy, requiring that all newly appointed professors explicitly state what they intend to do to take SD into account when they start working in their new position. This might help to reach group 4 as well.

We found that lecturers' motivation to integrate SD was more important than their thematic closeness to SD. But motivated lecturers often did not know how to connect their discipline with SD and how to create corresponding learning scenarios. Offering them concrete tools (see next section) to either reflect on what their discipline can inherently contribute to SD (in terms of knowledge, methods, and reflexive tools) or to broaden their teaching methods was a good way of getting them on board for mainstreaming SD in curricula.

How can these members be supported?

The most direct way of promoting SD would be to tell teachers how to do it. But imposing a new paradigm of teaching is a further trap to avoid. Rather than dictating an understanding of SD and a way of integrating it into teaching, the authors of this article prefer to discuss with teachers what didactics would be appropriate to achieve their teaching goal, to offer them tools that can help integrate SD, and to provide insights into processes that help develop competences for SD.

From a pedagogic and professional development perspective, if we want teachers to integrate SD into their courses we must support them at four different levels:

1. The level of formulating competences for SD;
2. The level of shifting towards a learner-centred approach;
3. The level of designing their learning environments;
4. The level of becoming a community of practice.

In order to reach as many teachers as possible, we decided to create some larger support options; but we also invested in developing smaller stones as parts of a bigger mosaic (towards a transformation). The numbers in the parentheses indicate the levels of support mentioned above.

Guidelines for ESD (1–3)
We first produced a set of guidelines with different goals (Herweg *et al.*, 2017). The guidelines' *Foundations* clarify the university's understanding of SD and ESD and its role in the whole process. Furthermore, this part introduces the need for a new teaching paradigm and offers ideas about how to find the link between SD and one's own discipline. The guidelines' *In-depth Module 1* shows ways of formulating adequate competences for SD and designing appropriate learning environments. It introduces different teaching methods for large and small audiences. In the *In-depth Module 2* (Fischer *et al.*, 2016), seven University teachers from various disciplines (from sports to politics, geography, and information systems) show through case studies how they incorporated ESD into their teaching. Among others, they describe the learning outcomes and the learning scenario they designed. This second in-depth module also works as a platform portraying the seven teachers and is a possibility of appreciating the effort they made. Two further *In-depth Modules* offer supplementary supporting material for University of Bern teachers and educational materials that teachers can adapt to their own needs.

Learning material (3)
We also produced different types of learning materials (e.g. interactive learning videos, quizzes, slide sets with comments) for teachers creating their own learning environment. This material can be used primarily to acquire a common understanding of what SD is, or to start a discussion about SD. The material is available on a website (www.esd.unibe.ch).

Continuing support and coaching (1–3)
In addition to the above materials and information, we designed courses and began offering individually tailored support or coaching for both thematic (SD and ESD) and pedagogical issues. Given the heterogeneity of faculties and the great diversity of lecturers, the production of general material such as guidelines and tools is only a first step. We realized that understanding of SD among teaching staff was often limited ("I thought SD meant environmental protection") and this made it difficult for them to establish a link to SD. There is no blueprint solution for this problem. Thus, coaching of individuals and groups will remain a permanent offer in the next few years. Since SD requires more than knowledge, thematic support must be combined with didactic-methodological advice to ensure that ESD competences are also developed. Here, we are still at the beginning, but successful first specimen

lectures integrating SD into highly diverse topics from theatre science to geology suggest that it is possible to identify links, even if they seem quite hidden for some subjects. The strategy here is not to overwhelm colleagues with standard procedures, but to initiate a dialogue that allows them to formulate their individual needs and discover new options, leaving space to include already existing knowledge of SD.

Networking (4)
As it requires quite some time for SD to be integrated in university research, education, and operations, we are focussing at this initial stage on building a critical mass of lecturers and students who are convinced of the importance of SD. Networking within and outside the university is essential to create alliances. To build a community of practice and enhance exchange between interested teachers, researchers, and students, an online collaboration and exchange platform has been set up.

Professional development course (1–4)
In a cooperation involving the Educational Development Unit and the Centre for Development and Environment, a two-day course entitled "Think global, teach local: Integrating Education for Sustainable Development into my own course" was developed. The course is and will continue to be offered as part of a professional development certificate. It addresses all four levels of support mentioned above. The main goal of the course is to enable participants to create their own innovative course with a clear SD component, and to join a community of professional practice.

Apart from helping participants to identify their disciplinary link to SD, we introduced several general competences for ESD (e.g. de Haan's, 2010, model of competence for ESD). We began translating competences into specific, achievable, and measurable learning outcomes, following Kennedy's (2006) recommendations (for a distinction between competences and learning outcomes, see the ECTS Users' Guide, EC, 2009, 13–14). Introducing and considering the idea of constructive alignment (Biggs and Tang, 2011), we then addressed teaching and later assessment methods. Our emphasis was on student-oriented and collaborative teaching methods with high levels of engagement.

Concluding Considerations

The authors of this article believe that universities cannot do their work as knowledge institutions and brokers without having clear and stable structures; at the same time, these structures need to remain flexible enough to adapt to changes required at the forefront of knowledge production as well as to demands coming

from society. While disciplines are necessary, as they allow research communities to go into greater heuristic depth when dealing with specific issues, they can also be barriers for a systemic understanding of such a broad issue as SD, especially if they act as "silos" (Pearson *et al.*, 2005). On the other hand, disciplines are also the source of a great variety of knowledge and scientific practices, as well as of innovatory ideas. In itself this is positive, but the sheer variety also makes it impossible to offer a "one-size-fits-all" version of integration of SD. A further issue to be considered is that SD should not be delegated to one new discipline, e.g. sustainability science. Here again: specialization is necessary, but the new discipline cannot be asked to work towards transformation vicariously for all the others. Everyone must be involved in transformation in one way or another. In addition to the epistemological limitation resulting from disciplinary approaches, an institutional limitation related to disciplinary structures needs to be tackled: the different disciplines will tend to compete rather than collaborate for funding, making it difficult to develop the interdisciplinary options that are needed for a focus on SD. Thus, mainstreaming SD throughout the disciplines represented at a university seems to be a good option, as it inevitably raises awareness of the need to collaborate beyond disciplinary borders. Indeed, this is essential if we want to better grasp the complexity of SD issues. At the same time, it invites all members of the institution to be part of the transformation process.

To conclude with a practice-oriented perspective: what the experience reported and analysed in this article reveals is the following. The ESD team realized that a number of lecturers find it very challenging to integrate SD into their discipline. We see three major levels where intervention is possible, based on a theory of change inspired by project management theory. *First*, it is important to motivate lecturers to engage with SD and provide them with opportunities to do so. Here, some top-down pressure can help. At the same time, bottom-up approaches relying on early adopters who have already pioneered ways of integrating SD into their teaching are of vital importance. Prioritizing target groups properly should eventually lead to a multiplier effect. Indeed, early adopters will motivate their colleagues on the one hand and spread the idea of SD into the student community on the other. This will eventually help build a critical mass. Furthermore, students will also carry SD knowledge, motivation, and competences out into society. At a *second* level, lecturers need assistance to find the link between SD and their discipline; this requires coaching and tools. *Third*, support for developing concrete learning scenarios is essential, as high-level and innovative teaching skills are needed to account for the shift towards more learner-centred teaching. This requires professional development in didactics. While integrating SD into teaching is a necessity for ESD, it is also an opportunity for a university as an institution to improve the effectiveness of its curricula. As a result of support at these three levels, students become change agents who engage in the search and learning process aimed at shaping SD pathways. If a university starts with such small steps

to integrate SD and allocates resources for a sufficiently long-term perspective, change will start happening within the organization and beyond, oriented by the desired transformation towards sustainable development.

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