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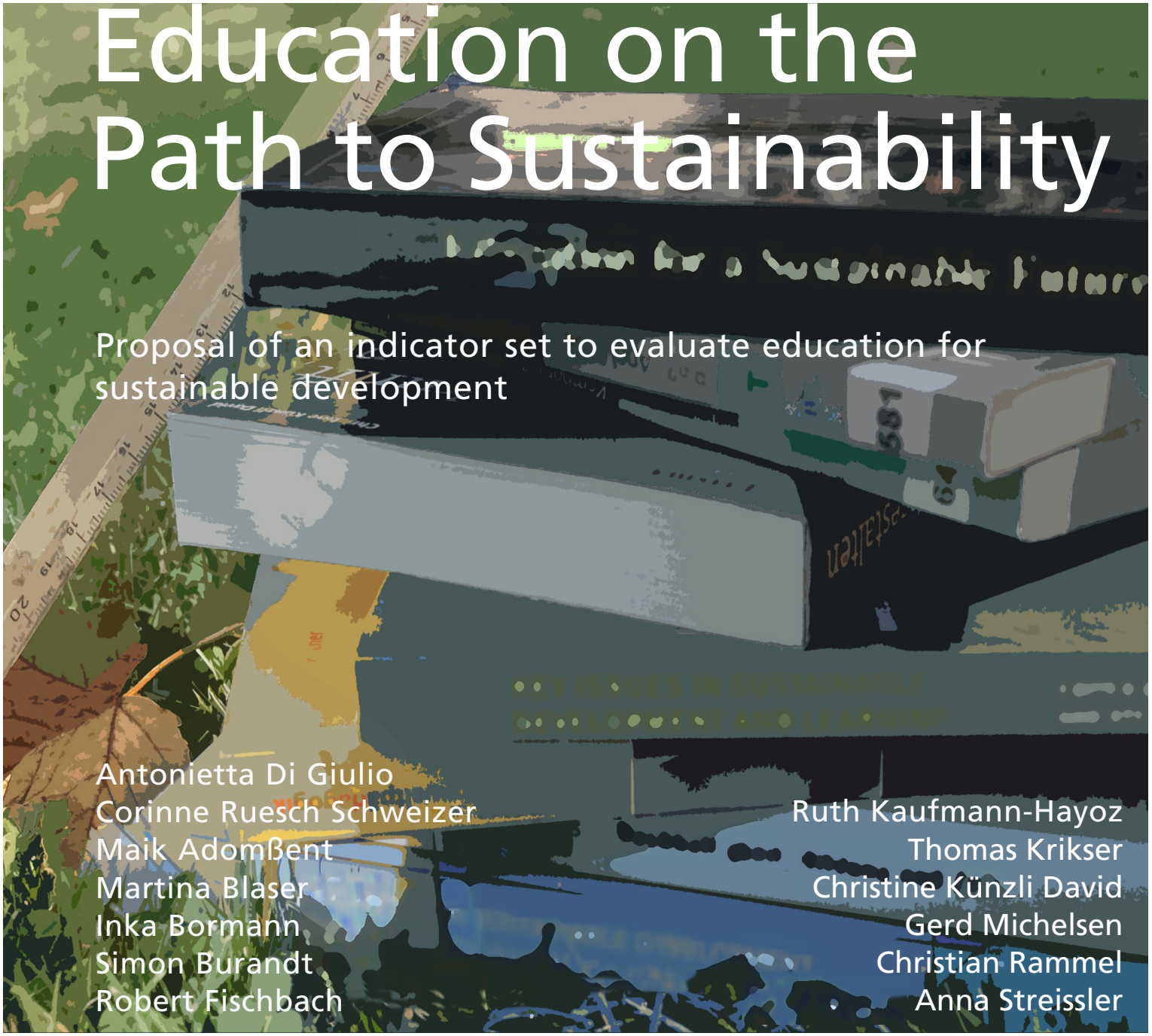
Education on the Path to Sustainability

Proposal of an indicator set to evaluate education for sustainable development



Antonietta Di Giulio
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English version by
Paul Lauer (Leuphana University Lüneburg), Antonietta Di Giulio (IKAÖ), Corinne Ruesch Schweizer (IKAÖ), Anna Schmuki (IKAÖ)

Corrected version

Address
University of Bern
Interdisciplinary Centre
for General Ecology (IKAÖ)
Schanzeneckstrasse 1
Postfach 8573
CH-3001 Bern
T +41 31 631 39 51
F +41 31 631 87 33
ikaoe@ikaoe.unibe.ch
www.ikaoe.unibe.ch

Cover
Lukas Oechslin

Editorial support
Stephan Gräni

Layout
Lukas Oechslin

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International research project

"Development of Indicators to Evaluate Offerings and Performance in the Area of Education for Sustainable Development (ESD)"

Project team

University of Bern
Dr. Antonietta Di Giulio (Project Management Switzerland)
Martina Blaser
Prof. em. Dr. Ruth Kaufmann-Hayoz
Prof. (PH) Dr. Christine Künzli David
Corinne Ruesch Schweizer

Leuphana University Lüneburg
Prof. Dr. Gerd Michelsen (Management of the Overall Project)
Dr. habil. Maik Adomßent
Dr. Simon Burandt

Freie Universität Berlin
Prof. Dr. Inka Bormann (Project Management Germany)
Robert Fischbach
Thomas Krikser

FORUM Environmental Education
Dr. Anna Streissler (Project Management Austria)
Dr. Christian Rammel

Preface

Bernhard Pulver

Although we are already approaching the end of the Decade of Education for Sustainable Development the United Nations launched in 2005, we still have time to achieve the goal of this Decade, to establish the idea of sustainability in national education systems. Events and commitments on the international level (Brundtland Commission Report, Agenda 21 etc.) were impulses for politics and science to become involved with the idea of sustainable development and become (more) active in this area. Meanwhile, in Switzerland sustainable development has been established in different articles of the Federal Constitution and several articles of the constitution of the Canton of Bern refer to sustainability as well. The Council of the Canton of Bern, in its Guidelines of Governmental Politics, identifies the "promotion of sustainable development" as a fundamental maxim.

In Switzerland, and also in the Canton of Bern, things have moved on. I am very happy about that. In order not to miss the goal of the Decade, it is now important to keep this process moving – in Switzerland, in Germany and in Austria, but also worldwide. That means existing measures have to be continued and new measures have to be adopted.

Measures to achieve this goal are one thing. Whether these measures will have the intended effects is another. Changes in the education system take time. It is not possible, for example, to change school and university curricula in the short term. And that is good as it is. To integrate the idea of sustainability at all levels of the education system thus requires much engagement and patience. We are making progress and I am determined to continue on this path towards more sustainability. It would be helpful here to know more about the effects of ongoing measures and to use this information to monitor developments in the field of ESD.

This is where the international project "Development of Indicators to Evaluate Offerings and Performance in the Area of Education for Sustainable Development" comes in. The ten ESD indicators developed within this project and described in this publication are meant to be a step on the path to an empirically founded basis of knowledge for educational policy decision-making. I expressly welcome the idea of incorporating these indicators and the knowledge they represent in national educational reports.

Allow me to point out some of the indicators which, due to political decisions, in the near future can be expected to develop positively in Switzerland. The establishment of sustainable development in the performance agreements with the institutions of higher education in Bern and the introduction of the "Lehrplan 21" (a harmonised school curriculum) with corresponding teaching materials should further enhance the existing SD competencies of our students in school and in higher education. As part of the "Programme of Measures 2007-2014 Education for Sustainable Development", support is provided for the integration of this topic in teacher education. And, finally, there is a great need for action in Switzerland and elsewhere with regard to another of the indicators, the awareness of sustainability in society. This is a challenge and a task for all of us.

Collecting data contributes to creating a knowledge base. The findings will of course often be interpreted in completely different ways. Nevertheless, they are always an important basis for discussion and decision-making. I support the recommendation emerging from the project to make use of existing data surveys and not to undertake new large-scale surveys. This is because teachers and lecturers, as well as students at school and in higher education, should concentrate on what is most important: teaching and learning.

I would like to warmly thank all those who collaborated on this project in Germany, Austria and Switzerland and who have worked on this publication. I hope all readers will find this publication stimulating reading.

Minister of Education
of the Canton of Bern

Dr. Bernhard Pulver
President of the Government Council

Contents

Chapter 1
Introduction

1.1. Initial situation, project team and funding

The United Nations declared the years 2005-2014 to be the Decade of Education for Sustainable Development (ESD). The goal of the Decade is to establish the idea of sustainability in national education systems around the world. Subsequently there was a call to develop and apply suitable indicators so as to be able to evaluate the implementation of the Decade's objectives. This call was followed by a number of initiatives and projects in different countries, including Switzerland, Germany and Austria. These efforts so far however remained largely independent. The international research project "Development of Indicators to Evaluate Offerings and Performance in the Area of Education for Sustainable Development (ESD)" (2008-2011) is a further endeavour, one however that aims at integrating and harmonising the initiatives in Germany, Austria and Switzerland.

The development of indicators for education for sustainable development fits the current efforts to systematically and continuously monitor the performance of education systems. These efforts aim to generate an empirical basis of knowledge for educational policy decision-making. Indicator-based educational reports are valued as suitable instruments to create the basis for steering the education system in all three countries. In addition to the purely informative nature of data (Kanaev et al. 2001), indicators enable a focused monitoring and follow-up of specific goals of education and their framework conditions. To some extent educational reporting is already institutionalized in the three countries, although in part it is still in the phase of development (KMK 2006; Specht 2008; Wolter 2008; Wolter et al. 2007). With regard to education for sustainable development, all three countries have a strategy at national level and at least to some extent also educational reports (Bundestagsbeschluss 2000; EDK 2007; BMLFUW, BMUKK, BMWF 2008). By developing indicators for education for sustainable development, the research project follows the general line in educational policy. The project thus strengthens the connectivity between the discussion on education for sustainable development and national indicator-based reporting and thereby the integration of education for sustainable development in national educational reporting (for the international level see e.g. UNESCO 2005).

The international project involved partners in Germany, Switzerland and Austria:
- Institute for Environmental Communication, Leuphana University Lüneburg (Maik Adomßent; Simon Burandt; Gerd Michelsen, Management of the Overall Project)
- Division of Educational Future Studies, Freie Universität Berlin (Inka Bormann, Project Management Germany; Robert Fischbach; Thomas Krikser)[1]
- Interdisciplinary Centre for General Ecology (IKAÖ), University of Bern (Martina Blaser; Antonietta Di Giulio, Project Management Switzerland; Ruth Kaufmann-Hayoz; Corinne Ruesch Schweizer; on a retainer basis Christine Künzli David (PH FHNW))[2]
- FORUM Environmental Education Vienna (Anna Streissler, Project Management Austria; Christian Rammel; Edith Weninger)

The project was funded in Germany by the Federal Ministry of Education and Research (BMBF), in Austria by the Federal Ministry for Education, Arts and Culture (BMUKK) and in Switzerland by the State Secretariat for Education and Research (SER).

1 We would like to thank Julia Kalisch (Freie Universität Berlin) for project support by doing preparatory work.

2 We would like to thank Thomas Kocherhans and Florian Schuppli (both University of Bern) for project support by doing preparatory work.

1.2. Goal of the project and expected results

The project's goal was to develop a set of indicators encompassing all levels of formal education (primary, secondary I and II, tertiary) in Germany, Austria and Switzerland, thus allowing the evaluation of the progress in integrating the idea of sustainability in the state-run education system[3] in a comprehensive way, both nationally and in international comparison.

The project thus focuses on the macro-level. In principle a review of how and to what extent the idea of sustainability is successfully integrated in the education system can focus on different levels:
- Macro-level – the education system as a whole: How successfully is the idea of sustainability integrated in the education system of a country as a whole?
- Meso-level – individual educational institutions (individual schools, colleges, universities): How successful are individual educational institutions in implementing the idea of sustainability in their relevant fields of action?
- Micro-level – individual teaching and learning processes: How successful are individual teachers in schools and institutions of higher education in teaching competencies in the field of sustainable development and to what extent do individual learners possess these competencies?

Depending on the level being reviewed, different objectives concerning the integration of sustainability in education will come into focus, i.e. different indicators and different approaches to data collection and data analysis will be necessary and possible. Developing a single set of indicators that would adequately represent all levels at the same time is thus neither possible nor useful. To focus on the macro-level is particularly important when it comes to evaluating the degree and quality of the integration of sustainability in a national education system.

To focus on the macro-level, that is, on the education system as a whole, entails that in the international project the processes on the meso- and the micro-level were of interest only insofar as they reveal how well the idea of sustainability is integrated in the education system as a whole. This is why in the project results the only question to be found concerning processes on the meso- and the micro-level is the extent to which they take place on a country-wide basis and whether the issue of quality is addressed.

The result of the project is a proposal as to which indicators can be used to evaluate the extent to which the idea of sustainability has been integrated in the education system (non-formal and informal education are not captured by the indicators developed; see also Section 5.6.). This set of indicators should meet the following requirements:
- *Build on what is already there:* Existing sets of indicators should be analysed and included in the project's results. This was achieved by analysing sets of state-recognized indicators in the areas of education, education for sustainable development and sustainability in order to determine whether individual indicators in these sets would be suitable for the indicator set being developed in the project.
- *Be validated by relevant actors:* The development of the set of indicators should incorporate the experience and insights of relevant actors in the participating countries. This was achieved by involving actors from the area of education and of education for sustainable development in several successive loops and in different ways in the development process (see Section 4 on the approach and Section 7 on the people involved).
- *Be connectable to national educational reporting:* The set of indicators should be such that the monitoring of offerings and performance in the area of education for sustainable development could in principle be integrated in the national educational reporting of the three countries. This was achieved, to the extent possible, by constructing indicators similar to conventional educational indicators.
- *Enable international comparability:* The set of indicators should enable an evaluation of the state of integration of sustainability in the education system with regard to a single country as well as an international comparison among German-speaking countries. This was achieved by in principle only including indicators that can be applied one-to-one or in an acceptably adapted form in all three participating countries.
- *Enable the documentation of progress:* The set of indicators should be suitable for documenting progress in the integration of sustainability in the education system. This was achieved by avoiding where possible the use of binary indicators, i.e. indicators restricted to responses such as 'yes, there is' or 'no, there isn't'.

3 The focus on state-run education does not at all mean that other non-state-run forms of education are unimportant, but simply that the state as an actor has an especially important role in the integration of sustainability in education (see also Section 2.2.).

- *Be manageable:* The set of indicators should be sufficiently extensive yet as concise as possible. In addition, it should, as far as possible, only include indicators whose use entails an acceptable amount of time and expense. This was achieved by, firstly, attempting to limit the set to indicators whose relevance and suitability was undisputed. This was achieved by designing the development process in several loops and involving exchange with relevant actors. Secondly, the applicability of the indicators in the participating countries was tested (see especially Section 4 on the approach).

A further goal of the project was to initiate an international discourse about the goals as well as the specific quality of formal education in the context of sustainable development. And it should also promote the transfer of knowledge regarding the idea of sustainability in education between the actors and institutions of the education systems.

In line with the goals of the project and the requirements to be fulfilled, the following items were not addressed and therefore are not part of the project's results, in particular:
- To review and systematically analyse the increasingly extensive literature on education and sustainability.
- To evaluate concrete suggestions on how to implement sustainability in teaching and learning processes and in educational institutions.
- To submit a proposal on how to implement sustainability in teaching and learning processes and in educational institutions (e.g. model of incremental competence, sustainability audit).
- To evaluate whether the measures being adopted in Switzerland, Germany and Austria to integrate sustainability in education are useful and effective or even propose such measures.
- To present the current situation regarding the integration of sustainability in the education systems in Switzerland, Germany and Austria in a comprehensive and comparative way (the project's results reflect the state of implementation only to the extent necessary to justify which indicators or criteria would be suitable for monitoring and evaluating the state of implementation).

The set of indicators developed in the project will be introduced in the respective national discussions on ESD indicators and educational indicators and should provide a basis for defining indicators that are not only nationally useful but also internationally coordinated. The project's results are thus primarily directed at specialists at the interface between the scientific discourse on education for sustainable development on the one hand and the practical integration of education for sustainable development in the education system on the macro-level on the other, but also at policy actors.[4] The project team claims neither to anticipate political decision-making nor to recommend which indicators should be used or even which target values should be the basis for evaluation. The project team considers the determination of indicators and target values to be used as a genuinely political process, for which the project can only provide the foundation.

4 As a supplement to the present publication a book publication is planned that is targeted at the scientific community and embeds the results presented here in detail in the scientific discourse on transfer research and the 'indicatorisation' of education.

Chapter 2
Theoretical foundations

The work in the international project is based on the following assumptions, which although being of major importance for the project have not been further justified, as this was not one of its objectives:
- Indicators should be predominantly quantitative; they should not have only a binary character in order to enable documentation of progress over the long term. This implies that the indicators meet specific quality requirements.
- Participative approaches are especially important in developing indicators in order to increase their acceptance.
- Education is mainly a task of the state; hence in the education system changes induced by the government are particularly important (this does not at all mean that non-state education services are unimportant). If the integration of sustainability in education is to be effectively promoted, then one actor must be particularly responsible; the integration of sustainability in education is to a large extent a task of the state. This implies that indicators for education for sustainable development should not be formulated without taking account of those factors steering the education system that are influenceable by the government.
- Sustainability should be integrated into education. In doing so the term sustainability should be used the way it has been defined by the United Nations. Basically, when judging the quality of the integration of sustainability in education, one can ask how closely the integration complies with this conceptualisation of sustainability. This should be taken into account in the formulation of indicators.

Important findings, theoretical approaches and central terminology that served as a basis for the project are outlined below. These are:
- Conceptualisation of indicators
- Steering factors as a basis to formulate desired end states for education for sustainable development
- Conceptualisation of sustainability and of education for sustainable development
- Overview with regard to the question which indicators suitable for evaluating education for sustainable development already exist and which have to be newly developed

2.1. Indicators

All three countries participating in the project have indicator-based national educational reports. In order to ensure the connectivity of the indicator set developed in the project with national educational reporting, the project uses the same conceptualisation of indicators as is used in these educational reports. This however does not mean that indicators are not controversially discussed in the three countries.

Accordingly, indicators are understood as quantitatively measurable values which represent complex (and not directly measurable) relationships (Döbert 2008). The purpose of indicators is not a goal-free description. Instead indicators are always normative because they explicitly or implicitly make assumptions about targets to be achieved, which motivate data collection and guide their interpretation. Educational indicators should therefore relate to specific goals of education or their framework conditions and make it possible to compare education systems and to document changes. However the collected data cannot be directly used as a basis for decision-making (see e.g. Tippelt 2009) as the data must first be interpreted. In the context of the increased and increasing use of indicators in education, the question must always be raised as to what indicators can and should measure and why this should be done. This requires criteria that make explicit and comprehensible which are the aspects of a goal that should be measured. This necessarily involves a reduction of complexity and must be accounted for by describing the relationship between the facts being measured and the immeasurable construct. This in turn determines the relevance of the indicator for the goal being evaluated. This relevance is a major quality criterion for the indicator. Indicators therefore have to be justified in the way shown above, transparently constructed and easily understood. In addition it must be stated whether the indicators will serve monitoring, evaluation or controlling purposes (Feller-Länzlinger et al. 2010).

The indicators resulting from the international project should enable the evaluation, both nationally and internationally, of the degree and quality of the integration of sustainability in the state-run education system. The indicator set thus primarily serves to aid monitoring and benchmarking and not the evaluation of concrete governmental measures. Indicators relate to clear objectives and can show the achievement or non-achievement of an objective or gradual changes in view of an objective. Although the integration of sustainable development in education is still in its infancy, binary indicators – which only show the achievement or non-achievement of an objective – are not appropriate; instead indicators that are able to document progress should be selected. The indicators are thus not to be understood as static; instead they should be continually reviewed and developed with regard to the different objectives and the underlying data basis.

Furthermore, indicators can measure different parts of the education system, meaning that they can relate to different 'locations' in the causal model of 'input-process-output' (see e.g. Döbert 2008). The indicators used in the national educational reports relate to the educationally relevant context as well as to the input that flows into the education system, the educational process and the impact of education. Accordingly, also with regard to education for sustainable development, indicators should be formulated for the context as well as for all three 'locations' of the causal model.

Finally, indicators must meet scientific quality criteria if they are to be used as reliable sources of information. This leads to the requirement that in the process of developing indicators it has not only to be ascertained that they are of crucial importance for the object being measured, but also that data for each indicator are available that are valid and reliable as well as timely and recurrently accessible or collectible with reasonable effort and whose relationship to the desired end state is comprehensible (Feller-Länzlinger et al. 2010). Indicators thus require updatable, representative data suitable for comparative purposes and allowing for differentiation. Official and semi-official statistics meet the minimum requirements for data determined, for example, by Klieme et al. (2006) for the German educational report. Data originating from surveys and panels do not necessarily meet these requirements, but nevertheless they can be made use of in the process of constructing indicators (Autorengruppe 2008; Fitz-Gibbons 2002; Fitz-Gibbons et al. 2002; van Ackeren et al. 2003). Given the present state in the discourse on education for sustainable development, in the implementation of education for sustainable development and in the data available for education for sustainable development, these requirements for indicators at the present time cannot all be met when developing indicators for education for sustainable development (see also Section 2.4. and 3).

Further important quality criteria are the legitimacy and acceptance of indicators, as indicators should not only be scientifically sound but always result also from negotiation processes. Participative processes can contribute to an appropriate consideration of legitimacy and acceptance of indicators already during their development. New indicators can be seen as innovations. Research on innovation and transfer shows that innovations meet with different reactions from recipients and are accordingly taken up in different ways (Spillane et al. 2002) and have different rates and ways of diffusion (Rogers 2003). During the process of acceptance, the innovation has to be adapted to the respective situation and thereby 'loaded' with a context-specific meaning, otherwise it has little chance of being adopted (Oelkers et al. 2008). The goal of having future users participate in the development of an innovation is thus to gain a better understanding of the possible situations where it can and should be applied and of possible context-specific meanings in order to diminish the critical hurdle between development and application (Euler et al. 1998). In the case of indicator development in the field of education for sustainable development, a participative approach is particularly important because it is not only the indicators themselves that are an innovation but education for sustainable development itself.

In addition to quantitative indicators there are also qualitative indicators (e.g. Frønes 2007, p. 8). However, because compared to quantitative indicators they cannot ensure a similar reliability in data acquisition and a similar comparability between different points in time and space, these do not correspond to the conceptualisation of indicators as used in educational reporting (Döbert 2008). Qualitative indicators have however the advantage that they are able to capture facts and document progress where quantitative values are not (yet) available. Qualitative indicators can thus be seen as a first step towards the development of quantitative ones. Furthermore, they provide a more differentiated understanding of the influencing factors and conditions of a given phenomenon. They are thus better suited than quantitative indicators for use in so-called realistic, that is context-sensitive, evaluations (Pawson and Tilley 2007; Blamey and MacKenzie 2007). To make sure that qualitative indicators have the necessary data quality, criteria on how to analyse and describe the object have to be defined so that the data have as high an intersubjective comprehensibility as possible and thus enable comparisons.

2.2. Steering factors as a basis to formulate objectives defining desired end states (DES objectives) for education for sustainable development

The indicator set proposed in the project was developed on the assumption that it is basically, although not exclusively, a task of the state to integrate sustainability in the education system, even though it is obvious that a number of actors are involved in steering the state education system, as research in educational governance clearly reveals (Altrichter et al. 2007; von Kopp 2008; Heinrich 2008; Lassnigg et al. 2001; for critique of new forms of steering see e.g. also Bellmann et al. 2007; Höhne et al. 2009). Thus, when selecting and formulating indicators for education for sustainable development, it has to be asked not only which core processes and core performance areas have to be looked at and what guides the actions of the different actors, but also which objectives defining desired end states (hereafter referred to as 'DES objectives') are actually influenceable by the government.

The question of which DES objectives with regard to education for sustainable development can be justified and formulated and can be regulated by the government, however, should not blind us to the fact that although national plans of action propose a number of measures for the integration of sustainability in the education system, in the area of education for sustainable development – as in other educational areas as well (Rürup et al. 2010, p. 383) – there are no unambiguous, or unambiguously quantifiable, political goals that can serve as objective benchmarks for indicators.

Concerning the question as to which DES objectives can be achieved by the government, it is helpful to differentiate between steering factors and steering instruments. Steering factors are phenomena that influence the actions of actors and can be influenced by the government (this is the "what?"). Steering instruments are measures and instruments that the government uses to influence these phenomena (this is the "how?"). For the indicator set being developed in the project it is the steering factors that are most interesting, as these indicate DES objectives that are actually achievable by the government. Due to the project's focus on the macro-level, only the question as to what can be governmentally steered is of interest. Thus all factors that are shaped by the community itself are excluded, although they of course are of equal importance for what the actors do (e.g. Altrichter et al. 2007; Nickel 2007b).

When it comes to identifying steering factors the following general points should be taken into account:

- A comprehensive study that is directly concerned with the question of what is steering the education system as a whole does not exist, nor one that focuses on individual levels of the education system. Likely steering factors primarily can be deduced, often only indirectly, from the issues discussed in publications and documents dealing with the steering of schools and institutions of higher education, with educational policy, with university reform, with school management and management of institutions of higher education (including quality management) etc. (e.g. Altrichter et al. 2007; Fend 2008; Schimank 2007).
- At least in the three countries participating in the project, educational institutions at the tertiary level are more autonomous than those at the primary level and those at the secondary levels I and II, and the same holds for the actions of individuals. Steering with regard to the tertiary level means then to a much greater extent than with regard to the other levels influencing framework conditions (e.g. Nickel 2007b; Pasternack 2006, 2008).
- The steering of schools is increasingly output-orientated and less often input-orientated (i.e. only the results of actions are set as objectives). The steering of higher education institutions is also increasingly output-orientated, demand-orientated (i.e. demand is more important that the individual actor's preferences) or process-orientated (i.e. by setting process objectives instead of content objectives). This results in new steering instruments that in turn suggest new steering factors (e.g. Feller-Länzlinger et al. 2010).

Steering factors at the primary level and at the secondary levels I and II

Actors at the primary and secondary levels I and II are primarily school teaching staff. Pupils are actors as well; however the government cannot – especially when they are young – influence their actions, at least not in a way that would be relevant in this context. Parents are further actors whose actions can at least indirectly be influenced by the government. With regard to steering by the government, schools as organizational units and the school administration should also receive attention (e.g. Altrichter et al. 2007; Seitz et al. 2005). This also holds for vocational education (being part of the secondary level II in Switzerland), even if it is only partly subject to governmental influence (vocational education in, for example, Switzerland is strongly influenced by e.g. private-sector organisations).

The central field in which actors at the primary level and the secondary levels I and II act (core performance area where they perform so-called core processes) is classroom teaching; another is, for all or some of the actors, school development and the administration of the school. The following factors are the object of school-steering instruments and therefore indicate steering factors (steering is possible in each case through the syllabus and similar means) (e.g. Biel et al. 1996; Bürchler 2008; Künzli 1999, 2006; Oelkers 2006; Tebrügge 2007; Vollstädt et al. 1999):

- *General:* legal framework (education legislation to labour law)
- *Framework conditions for school administration:* available resources; accountability; strategies/ mission statements; quality management; personnel development
- *Framework conditions for classroom teaching:* subjects combined with the time allotted to them and the corresponding competencies and contents; models of learning organization and school structures (vertical and horizontal differentiation); learning media/teaching media; education and development of teaching staff; examination formats, accreditation and certification (entry, advancement and graduation rules and regulations)

Steering factors at the tertiary level

The factors guiding the actors' behaviour at the tertiary level can be deduced from the logic of science (for universities of applied sciences, technical and teachers colleges and post-secondary vocational training the dominant logic is that of the professional or occupational field) and also from the issues discussed in relation to the steering and management of institutions of higher education (including quality assurance), and in relation to science policy. Actors at the tertiary level are primarily the members of a higher education institution (teachers and researchers; members of the management and of the administration). Students are also actors whose behaviour can be influenced by the government (e.g. policies limiting places ('numerus clausus') or allocating students to particular universities influence the availability of places at university and/or the attractiveness of a particular university for students). The steering of higher education institutions is a topic that touches on the autonomy of higher education; furthermore, the way in which institutions of higher education are governed is changing (the trend leading away from steering by government to self-monitoring). It is controversial as to whether and to what extent the state should influence the actions of tertiary level actors at all (e.g. Pasternack 2005).

The classic (and central) fields of action for actors at the tertiary level (the core areas of performance) are research (including research management, doctoral and post-doctoral programmes and other measures to promote young researchers), teaching (including continuing education) and the provision of services; additionally for some actors there is the management of the institution of higher education. In the context of governmental steering the relevant actors are institutions of higher education rather than individuals, as government efforts at steering are mostly directed at institutions.

The following are factors targeted by external steering instruments affecting institutions of higher education (internal instruments and the factors being the objects of them are thus excluded) and therefore indicate steering factors (influence is possible by defining contents, by setting process objectives, by budget allocation, through university committees, through rankings etc.) (e.g. Kehm et al. 2005; Mittag et al. 2008; Nickel 2007a, 2007b; Pasternack 2006, 2008; Teichler 2005; Ziegele 2002):

- *General:* legal framework (higher education legislation to labour law – including appointment procedures – and salary guidelines); accreditation (in Switzerland accreditation of institutions; a general accreditation of study programmes has been rejected, see here the debate on the qualification framework for Swiss higher education nqf.ch-HS; CRUS et al. 2008, 2009)
- *Framework conditions for management (including provision of services for the members of the institution and for students):* accountability/financial reporting; strategies/mission statements as well as goal-setting agreements (performance agreements) between the government and the institution of higher education; quality management; personnel development
- *Framework conditions for teaching:* system of descriptors and possible elements of profiles for (comparative) self-description of study programmes (including learning outcomes); standards for all study programmes at a given tertiary level (bachelor, master, doctoral etc.)
- *Framework conditions for research:* system of descriptors and possible elements of profiles for the (comparative) self-description of research centres etc.; directed (targeted) research (programmes) and/or research funded by government ministries (one variant of steering research by government is the contingent allocation of resources for projects dependent on the long-term commitment of the institution submitting the proposal, as this is already the case for the Swiss NCCR funded by the National Science Foundation)
- *Research, teaching and university administration affected to the same degree:* available resources; competition

2.3. Conceptualisation of sustainability and of education for sustainable development

The indicator set put forward in the project is based on the following considerations concerning sustainability and education for sustainable development.

Sustainability and sustainable development

In line with the basic assumptions outlined above, the work in the project is based on the conceptualisation of sustainability put forward by the United Nations. This conceptualisation, basically going back to the Brundtland Commission (Hauff 1987), differs from the everyday understanding of the term, or that used in forestry or ecology, by the goal it sets for a sustainable development (see Di Giulio 2004, p. 305ff). In everyday language 'sustainable' means that something is permanent or lasting, in forestry 'sustainable' means that a forest is managed so as to ensure continuous, highest possible use for the long term (for future generations) and in an ecological context 'sustainable' means that the natural environment as a whole should be managed so that natural resources are maintained for the long term (for future generations). In the definition of the United Nations, sustainability means that human development should be orientated towards the goal of satisfying the needs of all humans – present and future – and of ensuring all humans a good life. This state, the state of sustainability, is the goal of sustainable development.

This conception of sustainability is bound up with a large number of requirements that must be met in order for concrete projects, strategies and programmes to be called sustainable in the sense of the United Nations. These requirements include (for details see Di Giulio 2004) that
- a vision be articulated defining the good life that should be ensured for all human beings,
- ecological, economic and socio-cultural objectives are integrated,
- the value judgements needed for goal-setting and problem-solving are arrived at in a participative fashion in a dialogue involving all of society,
- a global as well as a long-term perspective be taken.

The idea of sustainability can be characterised as a regulative idea, i.e. as the state of sustainability aimed at is abstract and under-defined, it requires continuous re-concretization in its political implementation. Concrete strategies and measures cannot be directly derived from the idea as such. Instead the desired state must first be concretized in the form of objectives at various levels, to the point of having operationalized objectives with corresponding indicators. Strategies cannot be formulated and measures cannot be taken and evaluated before reaching this point. Yet this concretization cannot be done once and for all times, but must instead be able to be modified over the course of time (accordingly, the Austrian Strategy for Sustainable Development, for example, is understood as a 'learning strategy'; see Heinrich et al. 2007). It is thus important to clearly distinguish between the idea of sustainability on the one hand and the concretization of this idea in the form of objectives on the other.

Education for sustainable development

Education for sustainable development essentially means integrating the idea of sustainability and the goals of sustainable development in the education system. In accord with the assumptions and concepts set out in this project, this integration has to be based on the conceptualisation of sustainability by the United Nations and its accompanying requirements. This leads to the distinction between education for sustainable development and, for example, global learning, environmental education or political education (see here for example Künzli David et al. 2010). What education for sustainable development is certainly not about is the question of how to create learning processes so that the learning outcomes are lasting.

Policy documents at the international level list a broad range of tasks education in the context of sustainable development should fulfil – these include the tasks of increasing literacy, reducing poverty and limiting environmental destruction (de Haan et al. 2010). Such a broad understanding of education for sustainable development is, if it remains unstructured, not unproblematic as it risks straining the field of action for education for sustainable development (de Haan 2008; Bormann 2010a, 2010b, 2011). At the same time it would be wrong to deny that one of these tasks is a part of education in the context of sustainable development. Instead these tasks should be critically examined and reformulated in relation to higher-level education concerns.

Thus integrating and implementing the idea of sustainability and the goals of sustainable development in the education system have different and distinct forms because education in connection with sustainability has different functions. Statements relating to these different functions can be found in the documents published by the United Nations on sustainability and education for sustainable development, in scientific publications on education for sustainable development and in national strategies on sustainability and on education for sustainable development. Depending on the function, the integration of sustainability into the education system and its establishment in the education system is accomplished in different ways, although the discussion is led under the heading of 'education for sustainable development'. Analytically a total of five different functions can be identified (see Di Giulio and Künzli 2005, 2006 as well as Di Giulio 2006):

(1) *Concretized goal of the vision of sustainability – access to education:* In this function the implementation of education for sustainable development is about ensuring that all present and future generations of human beings have access to education and are able to exercise this right.
(2) *Education in cultural technologies as a pre-condition of sustainable development:* In this function the implementation of education for sustainable development is about ensuring that all present and future generations of human beings are educated in cultural technologies such as reading, writing and numeracy.
(3) *Education in specific competencies in the field of sustainable development:* In this function the implementation of education for sustainable development is about ensuring that all present and future generations of human beings are educated in competencies that emerge from the idea of sustainability (at the regulative idea level).
(4) *Education in competencies directed towards concretized goals of sustainable development:* In this function the implementation of education for sustainable development is about ensuring that there are enough individuals in a society with the (specialised) competencies needed to implement concretized goals of sustainable development (at the concretization level). This function relates to sustainability goals that have already been concretized and understands education instrumentally as a way to provide society with the competencies necessary in attaining (exactly) these goals. With a view to the implementation of education for sustainable development according to this function, it is (in contrast to function 3) impossible to formulate a general list of competencies. Instead the competencies that must be taught depend on the concretized goals that have been agreed upon on the one hand and on the level of the (specialised) competencies needed for their implementation within a society on the other hand. Therefore, according to this function education for sustainable development can be implemented in very diverse ways (it can relate to, for example, such diverse areas as health promotion, transparent municipal administration, renewable energies, organic farming, job safety etc.).
(5) *Implementation of sustainability in educational institutions and in the education policy sector:* In this function the implementation of education for sustainable development is about ensuring that educational institutions implement the goals of sustainable development and that they contribute, as part of society, to sustainable development (in the sense of a 'whole-school approach').

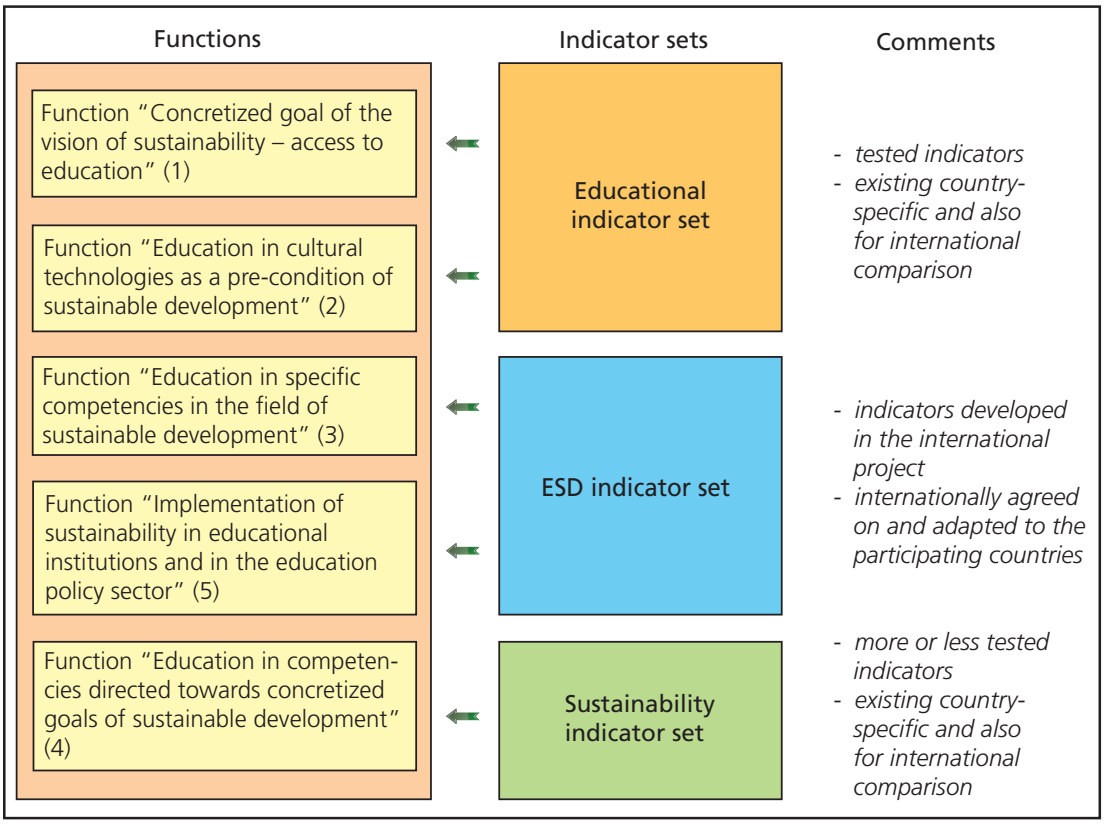
It goes without saying that these distinctions are analytical categories and that in the concrete implementation of education for sustainable development one and the same educational offering, one and the same initiative, can serve more than one of these functions at the same time.

In the project these five functions of education for sustainable development are taken as given, i.e. its work was based on this understanding of education for sustainable development and of its implementation. These five functions thus represent five different overarching goals with related fields of action for education for sustainable development. With regard to the integration of sustainability in the education system this implies that there are five different areas of desired end states, the attainment of which must be evaluated in both degree and quality. A comprehensive evaluation of the establishment of sustainability in the education system must take all five functions equally into account.

2.4. Indicators already existing and indicators that have to be newly developed by the project with a view to a comprehensive evaluation of the integration of sustainability in the education system

A comprehensive evaluation of the integration of sustainability in the education system must account for all five of these functions. This involves determining the desired end states and the corresponding indicators for each of these functions. Due to the diversity of these five functions, the project does not recommend using a single, comprehensive indicator set. Instead it recommends using modules to evaluate the integration of sustainability in the education system. In practical terms, the project proposes to use a specific indicator set for each of the five functions (see Figure 1).

Figure 1: Entry points to the evaluation of the integration of sustainability in the education system



An evaluation of the integration of sustainability in the education system should include all five functions of education for sustainable development. As Figure 1 shows, this requires three different and specific indicator sets, which are available in varying degrees of sophistication. Functions 1 and 2, access to education and education in cultural technologies, can be evaluated using existing, sophisticated educational indicators. The achievement of concrete sustainable development goals, and thus indirectly function 4, can – nationally and in international comparison – also be evaluated with currently available (sustainability) indicators. The internationally agreed ESD indicator set developed in the project enables the evaluation of functions 3 and 5.

Regarding the availability of suitable indicator sets, the results can be summarized as follows:

For function 1 *"Concretized goal of the vision of sustainability – access to education"* and function 2 *"Education in cultural technologies as a pre-condition of sustainable development"* there is, separate from the idea of sustainability, a tradition of developing and implementing (comparative) indicators, both at the national and the international level. For both of these functions there are sophisticated educational indicators and indicator sets (see Figure 1). This means that it was not necessary to develop new indicators for these two functions.

In function 4 *"Education in competencies directed towards concretized goals of sustainable development"*, education serves the purpose of helping to achieve concretized goals of sustainable development. That is the reason why the success of implementation depends on whether these objectives of

sustainable development are attained in a society. Hence, for this function an evaluation has to draw on sustainability indicators. Again, there are sustainability indicators now available which have been developed and are implemented in a national as well as in an international context (for comparative studies) independently of the discourse on education for sustainable development. This means that for this function there are sophisticated sustainability indicators and indicator sets at hand (see Figure 1) and it was not necessary to develop new indicators for this function. In specialised and vocational education as well as in corresponding further and continuing education functions 3 and 4 are to an extent identical, i.e. it is not possible to clearly delimit the two. This is why function 4 can be found at different points in the ESD indicator set developed in the project.

For function 3 *"Education in specific competencies in the field of sustainable development"* and function 5 *"Implementation of sustainability in educational institutions and in the education policy sector"* however there is no corresponding tradition of development and implementation of indicators and so there are no indicators and indicator sets available with the same degree of sophistication. The state of discourse here can be summarized as follows:

The first indicators for education for sustainable development, mainly relating to these two functions, were developed by international expert groups (see UNECE Expert Group 2006; as well as Tilbury et al. 2007). The UNECE indicator set was developed with the goal of supporting national government agencies in monitoring the implementation of education for sustainable development. The UNECE indicator set contains a total of 48 indicators for six different fields of action (policy, regulatory and operational frameworks; formal, non-formal and informal learning; teacher competencies; tools and materials; research and development; cooperation within the UNECE region). The indicators are to a large extent qualitative and many are also binary.

The UNECE indicator set does not clearly define and differentiate the different functions of education for sustainable development and does not provide a precise definition of sustainability. This indicator set is as a whole too extensive, it is not adapted to national conditions and it contains too many indicators with a binary character, which do not allow progress to be documented. Finally, in order to evaluate not only the degree but also the quality of education for sustainable development, indicators are needed that are specifically designed for functions 3 and 5. Such indicators must meet the requirements placed on the concretization of the idea of sustainability (see Section 2.3.) as well as the requirements outlined in Sections 1.2. and 2.1. The UNECE indicator set however explicitly calls for adaptation to national conditions (UNECE 2007).

As a result the international project has focused on constructing indicators for functions 3 and 5 and recommending a specific indicator set for these functions. In order to enable an evaluation of these two functions of education for sustainable development, it was necessary to develop new indicators – which of course make use of the existing proposals, originating largely from the UNECE indicator set. Thus, the resulting indicator set is exclusively related to functions 3 and 5 of education for sustainable development (see Figure 1). For ease of communication and considering that the indicator sets usable for functions 1, 2 and 4 were developed independently of the discourse on education for sustainable development, the indicator set developed in the project will be called below the 'ESD indicator set'.

The ESD indicator set recommended by the project focuses then on two of the functions of education for sustainable development and thus on two areas of desired end states with regard to the integration of sustainability in the education system. Therefore, these two functions will be described in more detail in the following. At the same time it will also be explained which quality standards must be met when implementing education for sustainable development according to these two functions.

Education in specific competencies in the field of sustainable development (function 3)

These competencies aim at enabling individuals to actively take part in the analysis and evaluation of development processes with a view to sustainable development by using knowledge from a number of different disciplines in an interdisciplinary approach. At the same time they should develop skills that enable them to orientate their own actions towards the dimensions (ecological, economic and social) of sustainable development so as to contribute to the improvement of the living conditions for present and future generations. Furthermore education in these competencies aims at creating the conditions needed so that people can cooperatively initiate and develop processes of sustainable development at local and global levels and that they can participate in the corresponding societal decision-making processes and in doing so are able to constructively deal with conflicts of interest and objectives.

The overall purpose of people acquiring specific competencies in the field of sustainable development is to enable them to actively contribute to sustainable development, to recognize problems of unsustainable development and to act in a way that both present and future generations have the chance to live a 'good life'.

With regard to implementation, the focus is on structured models of competencies ('models of incremental competence') grounded in debates on educational research related to the idea of sustainability and comprehensively reflecting the requirements and problems accompanying the idea of sustainability (e.g. Bertschy et al. 2007; de Haan 2008). At present there are still no broadly accepted and empirically tested models of incremental competence for education for sustainable development. For the primary and secondary level however there are proposals for such models of competencies, and also for the tertiary level research on this issue is being undertaken (e.g. Wiek et al. 2011). Complementary to such models of incremental competence for pupils and students, models of competencies for teachers at each level of the education system are needed. These should describe the knowledge and skills teachers need in order to be able to develop these competencies in learners (see e.g. UNECE 2011).

For learners implementing education for sustainable development in this sense means that they acquire such competencies appropriate to each level of their education, i.e. they acquire specific competencies in the field of sustainable development. For teachers at each educational level this means in turn that they are able to teach such competencies, i.e. they must have disciplinary and didactic knowledge and skills in education for sustainable development. To evaluate the implementation on the macro-level, the question is whether education in such competencies for learners and for teachers takes place and to what extent the population has such competencies.

Implementation of sustainability in educational institutions and the education policy sector (function 5)

As part of society schools, universities and other institutions of higher education have to contribute to sustainable development. Each educational establishment is called upon as an institution to achieve the goals of sustainable development in all of its fields of action – and not just in the field of teaching competencies as described in functions 3 and 4. With regard to schools this is known as the 'whole-school approach' (e.g. Tilbury et al. 2006). This means that educational institutions should orientate their actions towards sustainable development also in such fields of action as infrastructure, external relations, service provision, management, communication, administration and quality assurance. For universities this also goes for the field of action of (disciplinary, inter- and transdisciplinary) research and service provision. The orientation of all fields of action towards sustainable development (for schools e.g. Arbeitsgruppe Qualität 2007a, 2007b, 2007c; Rauch and Steiner 2006; Ofsted 2008, 2009; for universities e.g. Michelsen et al. 2008) encompasses education in the competencies stated above (function 3) and supports its implementation, the same as this education in turn supports the orientation towards sustainable development of the other fields of action of educational institutions.

To evaluate the implementation on the macro-level, the question is whether a general orientation of educational institutions towards sustainable development takes place. For an implementation at the meso-level of the individual educational institutions, a number of recommendations for support, evaluation and auditing are available (for schools e.g. de Haan et al. 2000; Bormann et al. 2004; UNESCO 2002; for universities e.g. Michelsen et al. 2008; Zimmermann et al. 2009; Rammel 2005, 2007). Of particular interest are approaches based on scientific discussions of the idea of sustainability which comprehensively reflect all of the demands and challenges accompanying the idea of sustainability and which account for all of the fields of action relevant to educational institutions and at the same time are based on a comprehensible and reasoned approach to organizational development.

Chapter 3
Limitations to the developed ESD indicator set

The use of indicators necessitates that relevant data exist or are easily collectable. Indicators are thus always dependent on the data available (see Section 2.1.). The operationalization of a goal as an indicator is characterised by the tension between seeking to represent the desired end state (the objective) as accurately as possible and the availability of data. If there are enough resources available to generate relevant data then data availability has less influence on criteria formulation than if indicators have to be created using solely pre-existing data.

The data acquired by applying indicators always needs to be interpreted. To allow an appropriate interpretation however, there must be explicitly defined target values and/or synchronic or diachronic comparative data. To operationalize goals and to define target values, knowledge in turn is required about the functioning of the system being observed on the one hand, and about the mechanisms of action with regard to the factors relevant to a given goal on the other. The research findings necessary for this however are often only sporadically available, if at all. As a result the development and use of indicators – also in education – are often based on more or less explicit assumptions. Finally, if indicators are to be a basis for steering decisions then there must be knowledge at hand of how to change the situation on which data is being collected. Such knowledge is incomplete as well.

In the project these general limitations were further exacerbated because of the object of interest, education for sustainable development (see Section 3.1. and Section 3.2.), and also because of the goal of ensuring international comparability (see Section 3.3.).

3.1. Limitations due to the state of implementation of education for sustainable development

The integration of sustainability in education has just begun, i.e. its implementation is still to a certain extent in the 'programmatic phase' (see here e.g. the relevant passages in the Swiss educational report 2010: SKBF 2010, p. 57). Moreover, the relevance of education for sustainable development is by no means unquestioned and its implementation strongly depends on individual actors. As a result, the implementation of sustainability in the education system has not yet been established. 'Programmatic searching' is characterised, amongst other things, by competing ideas about the profile and definition of education for sustainable development, with representatives of established areas such as global learning, political education or environmental education each laying claims to education for sustainable development. The discourse on education for sustainable development is not always conducted in a scientific manner, but is instead often political in nature and influenced by at times conflicting vested interests of different groups.

At present, this goes hand-in-hand with the disagreement about quality criteria for acquiring data on education for sustainable development. As a result there is effectively no systematic data on the implementation of sustainability in education with assured quality, i.e. the corresponding initiatives, measures and activities are not recorded in a standardized, impartial, systematic and scientific manner. For offerings in education for sustainable development, the only existing data are often data that were acquired through self-declaration, without sharp criteria having been used in their collection. Hence, much of what is presented under the heading of education for sustainable development is often not in line with the requirements accompanying sustainable development as it has been conceptualised by the United Nations.

As a data basis for indicators, data are needed that are collected in an impartial, standardised and theoretically and methodologically sound way, otherwise they cannot be used as reliable sources of information (see Section 2.1.). This can only partially be guaranteed for sustainability in education. At the same time there is very limited funding available for research into interdependencies and into possibilities of steering in the area of education for sustainable development and thus for the accurate and systematic generation of data as well as its interpretation. Hence, at present the knowledge needed

in order to formulate valid and reliable indicators is lacking, and the same goes for systematically and comprehensively tested models (e.g. models of competencies) that could consensually be drawn on in the operationalization process.

3.2. Education for sustainable development as a segment of the education system

The purpose of the indicators developed in the project is to represent the integration of sustainability in the education system. The indicators thus do not portray the education system as a whole but instead focus more closely on a specific, content-defined aspect of the education system. The ESD indicators thus do not represent the whole education system but only those aspects that are of particular importance for integrating sustainability in the education system.

The focus is not on a systemic or on an actor-based segment of the education system but instead on one that is defined by content; consequently the operationalization of the goals as indicators must take account of what data related to a content-defined segment can be collected in the first place. For example, it would be just as difficult to determine and isolate the amount of the educational budget spent on education for sustainable development as it would be for mathematics.

3.3. Limitations related to international comparability

The many differences among the education systems in Germany, Austria and Switzerland complicate their comparison. Therefore, the initial goal of the project was to define agreed desired end states for the integration of sustainability in the education system, which should be the core of a common ESD indicator set.

All the same, the indicators differ in detail. The different data bases in the three countries, conditioned by differences in their education systems on the one hand and by differences with regard to the total number of the educational institutions, which influenced, for example, the possibilities of contacting them individually in the course of data collection, on the other, resulted in some indicators having different criteria and in some criteria having different measurements. This negatively affects, as does the choice of using a number of qualitative criteria, the comparability of data for some of the proposed indicators, at least for the time being.

In the ESD indicator set developed in the project, the whole state-run education system of the three participating countries is taken into account. The one restriction concerns vocational education, which is only accounted for in Switzerland but not in Germany and Austria.

3.4. Conclusions regarding the ESD indicators developed in the project

The work in the project was based on the pragmatic premise that, in a first step, the operationalization and precise wording of the ESD indicators should, in spite of necessary compromises, be built on existing or at least easily obtainable data. The way objectives were operationalized by the project should therefore be understood as a first step on the way to achieving robust ESD indicators. To further develop the indicators, research investigating the assumptions the operationalization is based on is needed.

Furthermore the development of the indicators in the project had to be undertaken in consideration of the state of implementation of sustainability in education, even if it was not part of the project to study this state. Therefore, to formulate the indicators, assumptions had to be made about what could be realistically achieved with regard to the implementation of education for sustainable development over the next five years, although it was not part of the project to formulate and evaluate

measures facilitating this implementation. When selecting and formulating indicators then not only the relevance relating to the integration of sustainability in education was decisive but also a number of other questions:

- Are there already measures and initiatives in place that would be necessary to achieve a reasonable desired end state with a view to integrating sustainability in education? If not, can it be assumed that such measures and initiatives will be undertaken over the next five years so that it is still possible to formulate an indicator relating to this desired end state?
- Which objectives defining desired end states (DES objectives) must be necessarily represented in the ESD indicator set even though the indicators at present must remain underdetermined with regard to measurements and the data basis?
- Which data are available, i.e. which surveys can be realistically conducted without excessive effort and expense? Which data could be generated at acceptable effort and expense or by adapting regularly conducted surveys? What is the probability that certain data will be available within the next five years?

As a basic principle an effort was made in the project to only recommend quantitative indicators or at least such indicators that will likely be quantifiable within the next few years. But in the present case the first step in developing a quantitative indicator is often a systematic (i.e. criteria-based) qualitative analysis. That is the reason why the project does not only recommend indicators based on quantitative measurements, but also indicators that are combined with a qualitative analysis based on defining elements. Such qualitative indicators have the advantage that aspects important for the establishment of sustainable development in the education system can be included even though they are not (yet) quantifiable. They can, for example, supply information about how education for sustainable development is established in different contexts (Coburn 2003), which can in turn facilitate the generation of more suitable quantitative data. In order to improve the reliability of the qualitative analysis and to enable comparison between different points in time and the three participating countries, a guideline was developed for each of the qualitative indicators consisting of specific criteria for the description to be generated.

The international project is exploratory with regard to its goal of developing indicators to evaluate the extent to which the idea of sustainability has been integrated in the state-run education system. The project can produce indicators whose relevance is theoretically grounded, which refer to defined goals and explicitly describe the relationship between the objects being measured and the immeasurable construct; it can also produce indicators whose development is comprehensible, indicators that are understandable and broadly based on participative processes (for more on these requirements concerning the quality of indicators and indicator systems, as discussed for example by Feller-Länzlinger et al. (2010, p. 14f), see Section 2.1.). The expectation however to produce sophisticated indicators with proven validity and reliability, based on a good data basis and with proven cost effectiveness (following for example Feller-Länzlinger et al. 2010, p. 14f, see also Section 2.1.) cannot be fulfilled by the project. Furthermore, due to the project's orientation to existing or easily obtainable data, it cannot be claimed that the goals are operationalized in an optimum fashion.

Finally, in the operationalization the occurrence of the term 'sustainable development' or 'education for sustainable development' often played an important role in reducing the scope for interpretation. This was done in spite of the consequences in terms of further limitations. One limitation being that efforts in line with education for sustainable development that are not given this label cannot be recorded; another one being that activities are possibly recorded that, although labelled education for sustainable development, upon closer examination might not meet the quality requirements of education for sustainable development. This operationalization can be improved by further research (e.g. by developing and testing models of competencies or grounded systems of descriptors).

In addition to these general limitations there are limitations specific to the single indicators. These have to be identified in the course of the concretization preceding their application in a particular country.

Chapter 4
Methodological approach

The goal of the project was to develop a common ESD indicator set across national borders that also contains suggestions as to how the ESD indicator set could be applied in the three participating countries and that allows its integration in their national educational reports. The necessary theoretical and methodological foundations were developed by the interdisciplinary project team. The joint project was the organisational framework for the development of the indicators and provided the scientific framework for their national validation and practical testing. From the very beginning it was a declared concern of all project members to achieve a common result and that the work in the national subprojects should be informed by the common goals. This was facilitated by a common project timeline developed right at the start and a choice of methods that both enabled the different national work steps to be closely interrelated.

4.1. Methodology

The international project was not only interdisciplinary but also transdisciplinary in its approach, that is a broad basis was established for the ESD indicator set through a negotiation process among actors from science, politics and practice. The methods applied enabled the ESD indicator set to be developed and validated in a number of consecutive transdisciplinary loops in each country. Due to the chosen approach a number of different actors from different fields of reception were directly involved so that their interests and experiences could be integrated in the on-going research process and its result, the ESD indicator set. This participative procedure was intended to serve the purpose of removing implementation obstacles and increasing the legitimacy and acceptance of the project's results (e.g. Feller-Länzlinger et al. 2010). The results gained in the national loops were integrated by the international project team after each of the loops, and the results of this work of integration was the basis for the next national work steps.

As a very first step, the groundwork for the ESD indicator set was accomplished by analysis of existing indicator sets and explorative interviews with different actors in the education system. A preliminary version of the ESD indicator set was reviewed a number of times in structured expert workshops and an online questionnaire, and each review lead to a revised version of the set. At the end its national applicability was tested (pilot studies and feasibility studies). Each revised version was preceded by a synthesis workshop of the international steering group where the preceding evaluation results were integrated. The work on both the content and methodology of the synthesis workshops as well as the following-up of their results was the responsibility of the Swiss team. The emphasis of this project was thus on the science-based design, moderation and follow-up of integration-oriented dialogue processes, on both the international and respective national levels. In the following the individual methodological elements are briefly described.

4.2. The individual methodological elements

Analysis of existing indicator sets (summer 2008)

To generate a comprehensive starting point for the indicators being developed, documents were analysed with a view to the need, justification and structuring of an ESD indicator set, but also with a view to already existing indicators potentially related to ESD. The UNECE indicators, national and international educational indicators as well as the most important national and international sustainability indicators were given special consideration.

Expert interviews (summer 2008, autumn 2008, spring 2011)

The goal of the explorative expert interviews was first of all to document the experiences of the different actors with indicators and to know what concrete requirements should be placed on indicators for education for sustainable development. At later stages in the project, expert interviews were used to receive feedback on the completeness, comprehensibility, connectivity and applicability of the ESD indicator set. In total, 41 structured expert interviews were conducted (18 in Germany, 9 in Austria and 14 in Switzerland) with experts from the fields of education for sustainable development, educational indicators as well as educational planning. The experts were actors from academia, from political administration and from non-governmental organisations. Qualitative content analysis was used to interpret the interviews.

Expert and validation workshops (repeatedly in 2009)

Depending on the stage of development of the ESD indicator set, the goal of the individual workshops was either to collect wishes and considerations regarding suitable ESD indicators (expert workshops) or to discuss the applicability, clarity and benefit of the indicators (validation workshops). In total, four expert and validation workshops took place (two each in Germany and Switzerland), each with between 11 and 31 experts from academia, administration and educational practice; in Germany, the experts who had already been interviewed participated as well (the participants are listed in Section 7).

The structured workshops consisted of group and plenary discussions as well as peer procedures to evaluate each indicator and the ESD indicator set as a whole. The discussions were recorded. The goal of these discussions was to list the limits and potentials of the indicators, to identify indicators that did not meet the quality criteria as well as to find gaps and blind spots in the ESD indicator set. Furthermore, the discussions served to collect the experiences, requirements and expectations of the experts as well as to collect knowledge about the application conditions of the indicators. The current version of the ESD indicator set was sent to the experts before the workshop as preparation for the workshops (whenever possible accompanied by discussion points).

Review procedure (online questionnaire; winter 2008/2009)

The purpose of the survey with a standardized online questionnaire was primarily to evaluate the applicability, the clarity and the benefit of the individual indicators by a broad sample of ESD actors, mainly in Germany. A total of 795 actors from the area of (education for) sustainable development were asked to participate; 257 persons filled out the questionnaire. Besides asking respondents to evaluate the individual indicators with regard to the criteria informative value, benefit, importance and application on a four-point scale, the questionnaire included questions about the respondent's attitude to education for sustainable development and to indicators in general.

Applicability tests (summer 2009 to winter 2010)

The applicability of the indicators was tested in national applicability studies in each of the three participating countries. The goal of these studies, whose concerted country-specific implementations were designed in international agreement, was to specify and more closely define the indicators concerning content and methods, to examine the data basis, i.e. whether the data needed for the application of an indicator exists or can be generated at acceptable effort and expense, as well as to assess the coverage of the measurement results. This complex process of testing extended over all levels of the formal education system. Ideas for indicators brought forward by experts and accompanied by inventive and innovative ideas for data collection were, if the project team considered them to be plausible, tested and only rejected if they proved to be too difficult to implement or too unreliable in their measurement.

Synthesis workshops (June 2008, Oct. 2008, March 2009, Nov. 2009, Sept. 2010, May 2011)

The design of the project, which was interdisciplinary on the international level and transdisciplinary on the national one, required a painstaking, continual integration of the different theoretical approaches and of the findings resulting from the individual methods described. To this end the international project team met in several synthesis workshops. These workshops all shared the goal of collaboratively

developing the theoretical and methodological foundations of the project and discussing and integrating the results into increasingly sophisticated versions of the ESD indicator set. Between the workshops coordination and integration was carried out in writing.

Written consultation (July 2011)

Consultation was carried out by use of a short questionnaire. The questions were related to the explanations in Sections 1 to 5, to the general description of the indicators (Section 6) and to the country-specific concretization of the indicators for Switzerland (for pragmatic reasons as it was not thought to be practical to provide each respondent with the complete concretization for all three countries). The questions asked were about the intelligibility, organisation and completeness of the explanations in Sections 1 to 5, about the consistency and coherence between the theoretical and methodological foundations laid out in Sections 1 to 5 and the indicators as described in Section 6 and concretized for Switzerland, and about the comprehensibility, informative value, relevance and applicability of each indicator (per criterion) as described in Section 6. A total of 90 persons from 64 institutions in Switzerland had the opportunity to respond. They all were either engaged in education for sustainable development networks or dealt with education for sustainable development as part of their individual or institutional work. 20 persons from 17 institutions responded (27% of the institutions).

4.3. Critique of the methodological approach

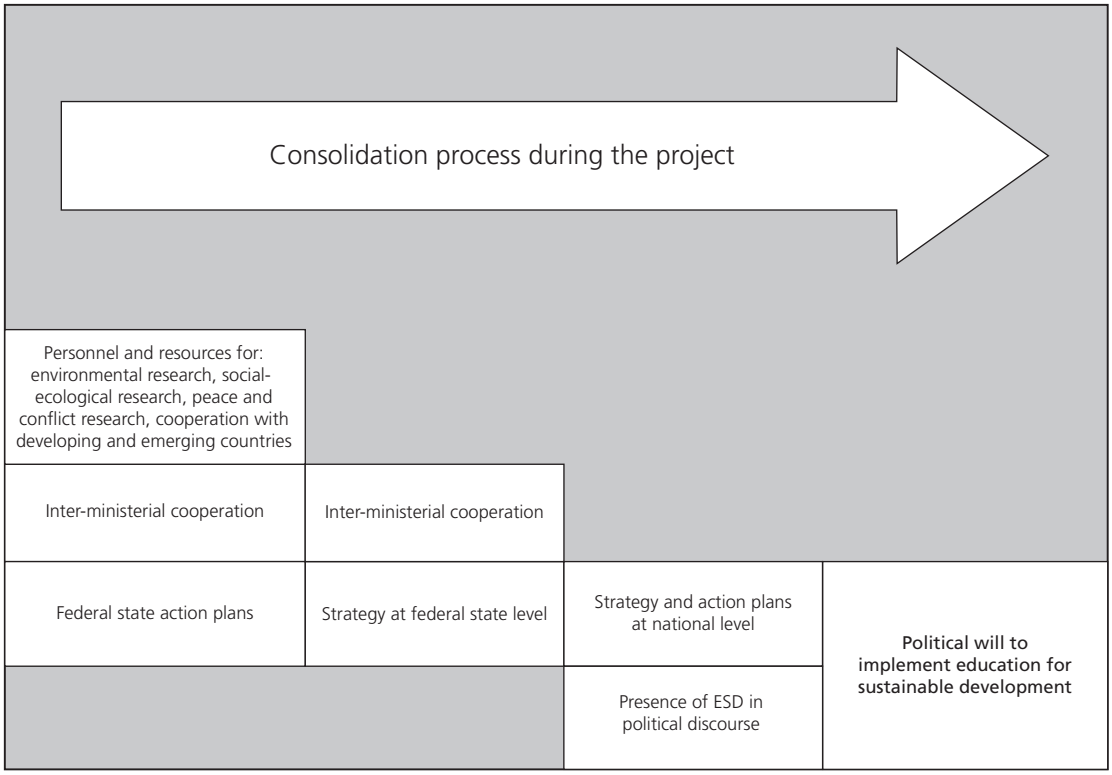
That the effort for developing a new, well-grounded indicator set would be great, not only because methodological quality has to be assured but also because of the crucial importance of the legitimacy of the indicators, is an experience that has not only be made in this project (e.g. Feller-Länzlinger et al. 2010). The chosen methodology and the involvement of different actors made it possible to develop and consolidate the ESD indicator set in a scientifically founded and participatively legitimized way. Thus, from originally over 20 indicators in the first version of the ESD indicator set, an ESD indicator set with 10 indicators for formal education emerged (the consolidation process is illustrated in Figures 2 and 3).

The results of the final consultation demonstrate that this approach was successful. The structure of the product was rated positively and the theoretical and methodological explanations in Sections 1 to 5 were considered intelligible, well-organised and complete. The indicators developed in the project were considered to meet the project's standards taking into account the outlined limitations. The overall evaluation concerning the comprehensibility of the indicators was good to very good.

The results of the consultation showed that the dialogue process could and should be continued. Although there is no indicator that was not assessed as relevant or very relevant by at least some of the respondents, the relevance of some of the indicators is more controversial than others. This demonstrates that developing indicators cannot pre-empt political decision-making. A particularly good example is an indicator that was recommended for Switzerland with two alternatives: specialized study programmes in sustainable development and elements of programmes in sustainable development for all students. The assessment as to which alternative should be preferred was controversial. This suggests that it is not the indicator that is controversial but the objective it is based on. And deciding which objective should be pursued is a political decision.

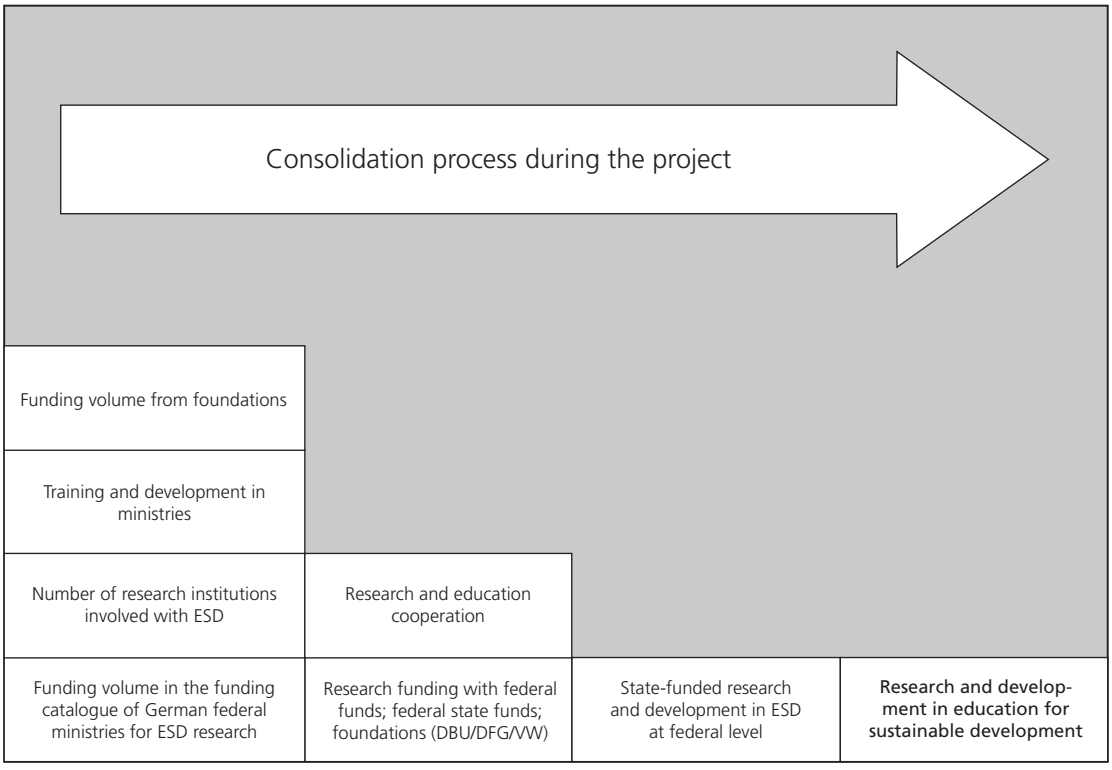
Finally, the consultation confirmed the limitations imposed on the project due to the state of implementation of education for sustainable development. The project team shares the view that the informative value and the applicability of some of the indicators are not especially high. In view of implementation, the data basis for individual indicators would have to be improved and the infrastructure for data collection would need to be built up. This of course must take place outside the project (see remarks in Section 5.6.).

Figure 2: Example 1 of consolidation process



The consolidation process is exemplarily shown for the indicator "Political will to implement education for sustainable development". The three original indicators were consolidated to a single one.

Figure 3: Example 2 of consolidation process



The consolidation process is exemplarily shown for the indicator "Research and development in education for sustainable development". The four original indicators were consolidated to a single one.

Chapter 5
Explanatory remarks on the proposed ESD indicator set

5.1. The education system and the designation of the educational levels

The designation of education levels in the ESD indicator set

To ease communication of the project's results, it was decided not to use the ISCED terminology to designate the education levels in the ESD indicator set. Instead, it was decided to use the more familiar terms 'primary level', 'secondary level I and II' and 'tertiary level'.

Short explanation of the education system in Germany

The primary level in Germany encompasses the *Grundschule* (primary schools) as well as (supplementary) day-care. The secondary level I includes the *Hauptschule* (general secondary schools), the *Realschule* (intermediate schools), the *Gesamtschule* (comprehensive schools) and the *Gymnasialstufe* (grammar schools to grade 10). In the secondary level II there are the *gymnasiale Oberstufe* (grammar schools to grade 12 or 13), the *Fachgymnasium* (specialized grammar schools), the 'dual system' (vocational education in schools and companies) as well as the *Berufsschule* (vocational schools). The tertiary level includes the universities, the *Fachhochschule* (universities of applied science), the *Berufsakademie* and the *Duale Hochschule* (both study programmes with a work component), the *Fachschule* und *-akademie* (trade and technical schools), schools in health care, the *Berufsoberschule* and the *Fachoberschule* (vocational upper secondary schools) as well as the *Abendschule* and the *Kolleg* (evening classes and post-secondary vocational schools).

Short explanation of the education system in Austria

The primary level in Austria includes (non-obligatory) pre-schools and the obligatory *Volksschule* (primary schools) including the *Sonderschule* (special needs schools). The secondary level is divided into secondary I and II. The obligatory secondary level I (grade 5 to 8) is subdivided into the *Gymnasium* (grammar schools), the *Neue Mittelschule* (new secondary schools), the *Hauptschule* (general secondary schools), and the *Sonderschule* (special needs schools). The secondary level II (grade 9 to max. grade 12) is subdivided into the *Gymnasium* (upper level grammar schools), the *Oberstufenrealgymnasium* (upper level academic secondary schools), the *Berufsbildende höhere Schule* (vocational colleges), the *Berufsbildende mittlere Schule* (vocational upper secondary schools), the *Polytechnische Schule* (polytechnic schools, grade 9 only) and the *Berufslehre und Berufsschule* (apprenticeship combined with vocational schools). The tertiary level (after grade 12) in Austria includes the universities, the *Fachhochschule* (universities of applied sciences), the *Pädagogische Hochschule* (universities of teacher education) and the *Kolleg* (post-secondary vocational schools).

Short explanation of the education system in Switzerland

The primary level in Switzerland encompasses the *Vorschule* (pre-schools) and the *Primarschule* (primary schools). The secondary level I consists of the schools offering education for grades 7 to 9 (last years of obligatory school education), the secondary level II consists of the *Maturitätsschule* (baccalaureate schools), the *Fachmittelschule* (upper-secondary specialized school) and the *Berufsschule* (vocational schools). The tertiary level includes the universities, the *Eidgenössische Technische Hochschule* (Swiss federal institutes of technology), the *Fachhochschule* (universities of applied sciences), the *Pädagogische Hochschule* (universities of teacher education) and the *Höhere Fachschule* (colleges of professional education and training).

5.2. Complexity reduction in the ESD indicator set

An indicator set can never represent all of reality and due to reliance on existing or at least easily and regularly collectible data an indicator set is in danger of replacing what should be evaluated with what can be collected. There is an additional danger that the necessity to reduce its comprehensiveness will lead to the things excluded for pragmatic reasons of applicability and acceptance being considered unimportant, although the restriction contains no such valuation.

The following points explain how and why complexity was reduced in the ESD indicator set developed by the project:

- The non-formal and the informal education sectors were explicitly excluded. Accordingly, the ESD indicator set does not contain any indicators for these educational sectors. This does not mean that non-formal and the informal education are somehow less important. But they function differently than formal education; other steering factors and other actors are important. In order to adequately document and evaluate the implementation of sustainability in non-formal and in informal education, a separate indicator set corresponding to the logic of these educational sectors would be necessary.
- Private educational institutions and private educational initiatives are excluded from the ESD indicator set. To focus on state-run education (including vocational education) does not mean that private educational institutions and private educational initiatives are unimportant in implementing sustainability in education. The reason for this focus is that in Switzerland, Germany and Austria education that is run and financed by the state is significantly more important than private education, whether in terms of resources or the number of people affected.
- Proceeding from the assumption that it is mainly the state's responsibility to promote the integration of sustainability in education, the indicators in the ESD indicator set are exclusively based on the question as to which desired end states (of implementing sustainability in education) could be especially influenced by the government (encompassing coordinating or moderating measures). This does not imply that the self-governance of the education system (e.g. by teaching staff, the scientific community or the learners) is unimportant.
- Due to the criterion of international comparability, the ESD indicator set contains, as a further limitation, almost exclusively indicators that are internationally applicable. If the data necessary for an indicator were unavailable and did not seem to be collectable in two of the three participating countries, the indicator was only included in exceptional cases.
- The indicators in the ESD indicator set were intended to enable the integration of sustainability in the education system to be evaluated as specifically as possible. As a result, when constructing the indicators, attention was paid to keeping the room for interpretation and extension as small as possible. This in turn has the disadvantage of excluding many aspects because for example they represent only first steps on the way to the integration of sustainability in education or because they are necessary but not sufficient conditions with regard to the integration of sustainability in the education system (e.g. the implementation of global learning or the interdisciplinary orientation of study programmes). This is not intended to diminish the importance of such efforts to integrate sustainability in education.

The ESD indicator set only claims to make appropriate recommendations on how to evaluate whether and how well sustainability is integrated in the education system and which aspects of the education system seem to be of central importance in this endeavour. This should also show what data would be necessary in order to make robust statements about the state of implementation of sustainability in education. The proposed ESD indicator set is not intended to be the last word in a discussion; on the contrary indicators and indicator sets in general – as this ESD indicator set – are understood as dynamic; they can and must be further developed and updated.

The ESD indicator set then does not claim to be able to capture everything that is important to the integration of sustainability in education. In fact there are many activities and initiatives that are important and cannot be captured by these indicators. In sum, the implementation of sustainability in education amounts to much more than what is represented by the indicators, and the indicators in the ESD indicator set do not provide a complete picture of the implementation.

5.3. Objectives defining desired end states (DES objectives) forming the basis of the ESD indicator set

Objectives defining desired end states (DES objectives) of sustainability being integrated in the education system are at the heart of the indicators of the proposed ESD indicator set. These DES objectives were defined in consideration of the central issues concerning function 3 "Education in specific competencies" and function 5 "Implementation in educational institutions" of education for sustainable development, taking into account the core processes and the core areas of performance at the different levels of formal education, and in consideration of what can be influenced by the state. The following DES objectives formed the basis of the indicators when constructing the indicators of the ESD indicator set:

For function 3 "Education in specific competencies in the field of sustainable development"

- Everyone has, during their school (and vocational) education, the possibility of acquiring competencies in the field of sustainable development.
- Teachers have the possibility to implement education for sustainable development without additional time and cost.
- Society has individuals with a specialised academic education in sustainable development. (In Switzerland as alternative: Everyone with an academic education has competencies in the field of sustainable development.)
- All occupational areas provide further education and advanced vocational training that is professionally qualifying in the field of sustainable development or education for sustainable development.
- Teachers have the qualifications needed to promote the specific competencies in the field of sustainable development in their students, as well as to support their school's orientation towards sustainable development.
- Opportunities to exchange experiences and knowledge about the implementation of education for sustainable development are taken advantage of.

For function 5 "Implementation of sustainability in educational institutions and in the education policy sector"

- Teachers have the qualifications needed to promote the specific competencies in the field of sustainable development in their students, as well as to support their school's orientation towards sustainable development.
- Opportunities to exchange experiences and knowledge about the implementation of education for sustainable development are taken advantage of.
- Educational institutions account for their orientation to sustainability in all fields of action.

Higher level DES objectives for both functions

- Education for sustainable development is an established field of scientific research.
- There is a continuous and binding governmental policy towards education for sustainable development at a national and a sub-national level.
- Sustainable development is a topic in society.

5.4. Description format used for the ESD indicator set

The individual indicators in the ESD indicator set are described according to the following format:*

I ## Indicator

Objective defining the desired end state (DES objective)

The *objective defining the desired end state (DES objective)* indicates the state the indicator refers to; that is, it defines which objective shall be evaluated with the help of the indicator with regard to its achievement.

Underlying assumptions and considerations for the operationalization

The *underlying assumptions and considerations for the operationalization* link the DES objective and the criterion; that is, in this section it is explained on which assumptions has been decided on the criterion (or criteria) being relevant for evaluating whether the desired end state has been achieved or whether a development is approaching the desired end state (reasons for relevance). In these explanations the relationship between the facts being measured and the immeasurable construct, gained from theoretical deliberations about sustainability, about education for sustainable development and about the factors steering the education system, is presented.

Function
see note A opposite page

Level
see note B opposite page

Location
see note C opposite page

Characteristic
see note D opposite page

Country-specific rationale behind the selection of criteria and the data basis (not part of the general description of the single indicators in Section 6)

The *country-specific rationale behind the selection of criteria and the data basis* explains, first of all, why a criterion has been chosen (or not chosen) for the country and how the chosen criterion (criteria) is (are) further concretized in this country. This encompasses considerations on the relationship between what is being measured and the immeasurable construct that are not theoretically founded, but are due to pragmatic reasons and due to the state of implementation of education for sustainable development in the country. Secondly, reasons are given as to why a particular data basis is recommended for use in this country. In this section, the state of implementation of education for sustainable development in the country is addressed as far as necessary.

Criterion

The *criterion* sets out which aspect of the desired end state is to be measured by the indicator, i.e. how the DES objective is simplified with a view to the measurement or the qualitative analysis (reduction of complexity). For a number of indicators it was possible to recommend criteria allowing an evaluation of the DES objective from an input as well as an output perspective. Due to different operationalization procedures, it is possible that an indicator has more than one criterion; these criteria have either a cumulative or alternative relationship to each other, depending on the data basis and the national situation.

Measurement / elements of description (not part of the general description of the single indicators in Section 6)

The *measurement* or *elements of description* indicate what should be measured in the quantitative collection of data or what should be analysed and described in the qualitative collection of data.

Data basis (not part of the general description of the single indicators in Section 6)

The *data basis* shows what data basis can currently be accessed in a country for quantitative or qualitative analysis.

Procedure (not part of the general description of the single indicators in Section 6)

The *procedure* lists the individual steps in data generation.

Informative value, advantages/disadvantages, prospects (not part of the general description of the single indicators in Section 6)

This part of the description contains comments on the *informative value* of the indicator as it is applied in a country, on the *advantages and disadvantages* of its application with the recommended data basis as well as an outlook to its further modification or complementation. It also gives information on data needed for a robust valuation, whether collected through specific documentation (e.g. using relevant keywords for project descriptions by research funding organisations) or through the integration of relevant questions in existing and reoccurring surveys (e.g. surveys of teaching staff). All of these comments are to be made for each criterion.

(A) *Function* shows which of the five functions of education for sustainable development the indicator refers to.
(B) *Level* shows which level(s) of formal education the indicator refers to in the evaluation of the implementation of education for sustainable development.
(C) *Location* shows which 'location' the indicator relates to in the causal model of 'input-process-output'. If an indicator is located as relating to 'input' then the exercise of influence (e.g. expenditure, requirements and guidelines) will be measured or described. If an indicator is located as relating to 'process', then the actions of actors in the education system will be represented. If an indicator is located as relating to 'output', then the results and effects (e.g. educational attainment levels) will be captured. If there is more than one criterion for an indicator then there will be a location for each one.
(D) *Characteristic* shows whether the indicator is quantitative or qualitative. If a qualitative indicator has the potential to become a quantitative one, then there will be a comment to that effect. If there is more than one criterion for an indicator, then the characteristic will be indicated for each criterion.

* The general description of the indicators in Section 6 of this publication (using this format) does not include all the elements described here. Some of these elements cannot be defined on a general level, as they are part of the concretization of the indicators for a given country. In the project this country-specific concretization of the indicators has been done for Austria, Germany and Switzerland, and the results of this work package are not included in the English version of the publication.

5.5. Overview of the indicators in the ESD indicator set

Table 1 sets out the indicators in the proposed ESD indicator set. The indicators of the ESD indicator set are to a large extent indicators originating from the further development and adaptation of indicators in the UNECE indicator set. In addition care was taken that the indicators are connectable to the national educational reporting in the three participating countries and the indicators already being used there. These references are shown in Table 1, that is, for each indicator there is information as to which UNECE indicator it is based on and whether it was constructed in analogy to the indicators in one of the national educational indicator sets. These references are numerical; a detailed overview of all indicators referred to is found in the Appendix.

Table 1: Overview of the ESD indicator set

No.	Name of the indicator and DES objective	A	F	Level	Characteristic	Connectivity
Education in specific competencies in the field of sustainable development						
1	**Competencies in the field of sustainable development** *DES objective: Everyone has, during their school (and vocational) education, the possibility of acquiring competencies in the field of sustainable development.*	D CH A	3	Prim Sec I+II	Quali Quant	UNECE 2.1 BIB: Competencies
2	**Teaching materials for education for sustainable development** *DES objective: Teachers have the possibility to implement education for sustainable development without additional time and cost.*	D CH A	3	Prim Sec I+II	Quali	UNECE 4.2
3a	**Sustainability study programmes in higher education** *DES objective: Society has individuals with a specialised academic education in sustainable development.*	D CH A	3/4	Ter	Quant	UNECE 2.1 BIB: Participation in education/ educational offerings
3b	**Competencies in the field of sustainable development in higher education** *DES objective: Everyone with an academic education has competencies in the field of sustainable development.*	CH	3	Ter	Quant	UNECE 2.1 BIB: Competencies

No.	Name of the indicator and DES objective	A	F	Level	Char-acter-istic	Connectiv-ity
4	**Further education in sustainability or education for sustainable development** *DES objective: All occupational areas provide further education and advanced vocational training that is professionally qualifying in the field of sustainable development or education for sustainable development.*	CH	3/4	Ter	Quant	UNECE 2.1 BIB: Participation in education/ educational offerings
Teachers' competencies in implementing education for sustainable development						
5	**Education of future teachers in education for sustainable development** *DES objective: Teachers have the qualifications needed to promote the specific competencies in the field of sustainable development in their students, as well as to support their school's orientation towards sustainable development.*	D CH A	3/5	Ter	Quant	UNECE 3.1
6	**Networks for actors in the field of education for sustainable development** *DES objective: Opportunities to exchange experiences and knowledge about the implementation of education for sustainable development are taken advantage of.*	D CH A	3/5	Prim Sec I+II Ter	Quant Quali	UNECE 3.2
Orientation of educational institutions to sustainability						
7	**Reporting on the orientation of educational institutions to sustainability** *DES objective: Educational institutions account for their orientation to sustainability in all fields of action.*	D CH A	5	Prim Sec I+II Ter	Quant Quali	UNECE 2.3/2.4 BIB: Evaluation practice
Establishment of education for sustainable development						
8	**Research and development in education for sustainable development** *DES objective: Education for sustainable development is an established field of scientific research.*	D CH A	super	Ter	Quant	UNECE 5.1/5.3 BIB: Education expenditures/ investments
9	**Political will to implement education for sustainable development** *DES objective: There is a continuous and binding governmental policy towards education for sustainable development at a national and a sub-national level.*	D CH A	super	Prim Sec I+II Ter	Quali	UNECE 1.2/2.2 BIB: Education system
Societal awareness of sustainability						
10	**Awareness of the issue of sustainability in society** *DES objective: Sustainable development is a topic in society.*	D (CH) (A)	super	–	Quant	BIB: Context

Explanation of abbreviations in table:

- A: Countries or country for which a country-specific concretization is available (only in German, not included in the English version of the publication)
- F: Function of education for sustainable development as described in Section 2.3. (3= function 3 "Education in specific competencies in the field of sustainable development", 4= function 4 "Education in competencies directed towards concretized goals of sustainable development", 5= function 5 "Implementation of sustainability in educational institutions and in the education policy sector", super= superordinate)
- Level: Educational level (Prim= Primary level, Sec I+II= Secondary level I+II, Ter= Tertiary level)
- Characteristic: Character of the indicator (Quali= qualitative analysis, Quant= quantitative collection)
- Connectivity: UNECE= Further development or adaptation of indicator from UNECE indicators (see Appendix A); BIB= Connectivity to national and international educational indicators (see Appendix B)

The ESD indicators capture only a specific aspect of the whole education system, namely the integration of sustainability. They were developed with the goal of capturing progress and quality in the field of education for sustainable development in relation to desired end states. Accordingly, the ESD indicator set does not have to depict the causal model in its entirety and as accurately as possible, as is the case for educational reports, which cover the whole education system. Instead the focus is on the individual desired end states of education for sustainable development, each with its own system of cause and effect. As a result locating the ESD indicators in the causal model of input-process-output-outcome does not refer to the mechanisms of the education system as a whole but instead to the specific mechanisms important for the respective DES objective. Due to the state of implementation of education for sustainable development and the available data, most indicators are located in the input, even those that would ideally be captured as output (e.g. competencies). That no criterion is suggested for the outcome also parallels the state of implementation of education for sustainable development and the situation with regard to the data that is either available or can be generated at acceptable effort and expense (see Section 3). Table 2 gives an overview of the location of the criteria of the ESD indicator set.

Table 2: The criteria of the ESD indicator set located in the causal model

ESD indicators	Context	Input	Process	Output	Outcome
1 Competencies in the field of sustainable development		C1 C2			
2 Teaching materials for education for sustainable development		C			
3a Sustainability study programmes in higher education		C (D)		C (CH) C (A)	
3b Competencies in the field of sustainable development in higher education		C			
4 Further education in sustainability or education for sustainable development		C			
5 Education of future teachers in education for sustainable development		C (CH) C (A)	C (D)		
6 Networks for actors in the field of education for sustainable development			C1 C2		
7 Reporting on the orientation of educational institutions to sustainability		C1		C2 C3	
8 Research and development in education for sustainable development		C1		C2 C3	
9 Political will to implement education for sustainable development	C				
10 Awareness of the issue of sustainability in society	C				

Explanations of abbreviations in table:
- C#: Criterion or criteria
- C (CH/A/D): Country-specific criterion

5.6. Use and further development of the ESD indicator set

In the first years of the Decade for Education for Sustainable Development, a number of important initiatives were launched to establish education for sustainable development. The political will to integrate and anchor the idea of sustainability as a societal mandate in education can be found in all three countries. Nevertheless the attempt to integrate ESD indicators in existing procedures of educational reporting (such as university reports or performance reports) or in processes of evaluation and monitoring (such as sustainability reports) risks coming to nothing, in particular owing to the argument that it causes additional effort and expenses (Albrecht 2009).

Against the background of sustainability becoming increasingly well established in the education system, the project presents well-founded ESD indicators that are applicable, manageable (in terms of size) and capable of being integrated in the national educational reporting of the three participating countries. At the same time this ESD indicator set can be further developed and expanded at relatively little effort and expense.

The goal of the project was to contribute to the development of an instrument allowing the evaluation of the quality and progress in integrating the idea of sustainability in the state-run education system and thus providing a basis to decide on measures to optimise this integration. The ESD indicator set now at hand is merely a first step in the development of such instruments. Further efforts are necessary before it can be applied. In addition it can and of course must be further developed, and it can also be extended in its coverage. In one of the interviews with an expert, its status has been acknowledged accordingly: "Somewhere a start has to be made. In applying the indicators with the defined criteria, on the one hand it will be seen how well they stand the test and, on the other, with continued use over a period of time they will have to be developed".

Concerning the application of the proposed ESD indicator set the following points should be emphasised:

- The indicators are, with few exceptions, suitable for application in all three participating countries. Possibilities for country-specific concretization have been elaborated for each of the indicators (this has been done for Austria, Germany and Switzerland, but it is not part of the English version of the publication). In order to be able to compare results between countries, each indicator in the ESD indicator set should be applied if possible in each country.
- If the indicators are applied only nationally, each of them can be given different weights.
- In order to be able to apply the ESD indicator set over the long-term, target values have to be set for the quantitative indicators. The project deliberately refrained from both defining target values and recommending such values, as setting target values is considered to be a political decision and should be the result of a political negotiation process (see here the comments in Section 1.2.). The target values can be based on the first application of the ESD indicator set.
- The implementation of the idea of sustainability in education cannot be comprehensively evaluated by applying only the ESD indicator set developed in the project. Rather the other functions of education for sustainable development should receive appropriate consideration as well by constructing an indicator set that contains indicators for all five modules (see Figure 1 in Section 2.4.).
- The indicators in the ESD indicator set do not yet fulfil all of the requirements necessary for indicators used in national educational reporting. Nevertheless, education for sustainable development should be included in future national educational reports so as to evaluate the implementation of the idea of sustainability as an integral part of educational reporting. Establishing a separate reporting for the field of education for sustainable development would not do justice to the aim of integrating sustainability in education.

Further steps towards applying the ESD indicator set

As already mentioned, the present proposal for ESD indicators is just a first step on the way to implementing these indicators. To implement the ESD indicator set, the following interrelated steps would be necessary:

Organizational steps would be necessary with regard to the infrastructure needed in order to apply the ESD indicator set. Docking onto already institutionalised vehicles, such as for example national educational reporting, could ensure the establishment of the ESD indicators. Furthermore, the infrastructure and the responsibilities for data collection would have to be defined.

Political steps (further consultations, negotiations and decisions) would be necessary with regard to the political legitimation, commitment and finally implementation of the indicators. The research project with its results can only provide a basis for the initial political decision (see Section 4.3.). Also on the political level the target values would have to be determined for the individual indicators and thus the operationalized goals for the integration of education for sustainable development in the education system. This requires comparative data, which could be generated by the first application of the indicators. Accordingly, from the data that now can be generated by the proposed indicators in the participating countries, recommendations for political decisions or for the educational practice of sustainable development cannot yet be derived.

Further steps would also be needed with regard to generating knowledge. The mechanisms of action in education for sustainable development would have to be researched in specific research projects with the aim, on the one hand, to verify the underlying assumptions of each indicator and, on the other hand, to provide a basis for the interpretation of the data (see Section 3.1.). Knowledge would have to be produced about causal or other relationships and mechanisms of action between indicators. To move beyond a mere description of the integration of education for sustainable development in the education system, the change sensitivity of the indicators would also have to be investigated (i.e. how changes represented in data should be interpreted). And finally the question would have to be answered as to how the states being captured can be transformed.

Different actors would have to be involved in these organisational, political and knowledge-generating steps and these interfaces would need special attention. The interaction between all these actors can and must take on different forms and move in different directions, as has been shown by research on the issue of utilising scientific findings. Scientific knowledge is not implemented quickly in a linear and comprehensive fashion; rather, this is a long-lasting, often informal process of changes in perspectives and attitudes, during which a selective use or a simplification of knowledge cannot be excluded (e.g. Weiss 1978; Beck/Bonß 1989; Dedering 2010). This has to be taken into account especially when applying indicators and interpreting the corresponding data, i.e. measures should be taken to prevent erroneous conclusions from being drawn from the indicators that could then lead to inappropriate reactions.

Improving the underlying data basis for individual indicators

For many of the indicators the underlying data in the participating countries needs to be improved to optimize their informative value and their utility; this was confirmed in the consultation towards the end of the project (see Section 4.3.). In certain areas it would be desirable to have some data in the first place or additional data, which are not (yet) available, e.g. for indicators relating to higher education. For some other indicators on the other hand only a continued collection of the items related to sustainability is needed or additional information so that the collected data can be related to the corresponding aggregate values. Such additional data could be generated by special supplementary surveys or by an extension of existing or planned surveys (e.g. regular questionnaires for teaching staff). For a number of databases and registers it would be desirable to install a separate search category 'sustainable development'. It would be relatively easy to fulfil the demand for informative and suitable data material in other formats than at present, e.g. to make textbooks available in electronic form (pdf format) for the application of automated search routines. In the current programmatic phase of establishing education for sustainable development there are still fundamental developments taking place that will also affect the possibilities of data collection (e.g. in Switzerland the establishment of an agency for education for sustainable development or efforts to integrate education for sustainable development in grammar schools). Furthermore, surveys are now being carried out from which new data can be expected (e.g. an inventory of education for sustainable development activities in vocational schools in Switzerland).

Participative further development of the ESD indicator set

Indicator systems must be understood as dynamic projects, which necessitate their continual review and further development (e.g. Feller-Länzlinger et al. 2010). When developing additional indicators for education for sustainable development, we recommend initiating procedures of consultation that emphasise the participative involvement of a variety of interest groups. Thus, problems of 'translation' (for example between science and educational practice) and of legitimation can be prevented or at least minimized from the outset. The experiences made in the international project once more confirmed that the development of indicators is an extremely complex process that is characterised by a certain potential for conflict. In this development process numerous, at times quite different, interests are affected and these must be negotiated and integrated.

Supplements to the ESD indicator set

The ESD indicator set can, for example, be supplemented to include educational sectors that were not examined more closely or were excluded from this set. This is possible for example with regard to non-formal or informal education. Indicators in these sectors must focus on educational offerings that provide individuals (non-compulsory) opportunities to deepen their knowledge of sustainability and their competencies in this field. This could take e.g. the form of competitions with appropriate provisions for preparation, such as Youth Research, the Science Olympiad or Democratic Citizenship or the form of special educational programmes, e.g. from biosphere reserves. When developing indicators focussing on such offerings, it is important to be careful that these offerings are long-term and of high-quality if they are to do justice to the complexity of sustainability.

Explanation of abbreviations in table (opposite page):

- F: Function of education for sustainable development as described in Section 2.3. (3= function 3 "Education in specific competencies in the field of sustainable development", 4= function 4 "Education in competencies directed towards concretized goals of sustainable development", 5= function 5 "Implementation of sustainability in educational institutions and in the education policy sector", super= superordinate)
- Level: Educational level (Prim= Primary level, Sec I+II= Secondary level I+II, Ter= Tertiary level)
- Characteristic: Character of the indicator (Quali= qualitative analysis, Quant= quantitative collection)

Chapter 6
The ESD indicator set

No.	Name of the indicator and DES objective	F	Level	Charac-teristic
Education in specific competencies in the field of sustainable development				
1	**Competencies in the field of sustainable development** *DES objective: Everyone has, during their school (and vocational) education, the possibility of acquiring competencies in the field of sustainable development.*	3	Prim Sec I+II	Quali Quant
2	**Teaching materials for education for sustainable development** *DES objective: Teachers have the possibility to implement education for sustainable development without additional time and cost.*	3	Prim Sec I+II	Quali
3a	**Sustainability study programmes in higher education** *DES objective: Society has individuals with a specialised academic education in sustainable development.*	3/4	Ter	Quant
3b	**Competencies in the field of sustainable development in higher education** *DES objective: Everyone with an academic education has competencies in the field of sustainable development.*	3	Ter	Quant
4	**Further education in sustainability or education for sustainable development** *DES objective: All occupational areas provide further education and advanced vocational training that is professionally qualifying in the field of sustainable development or education for sustainable development*	3/4	Ter	Quant
Teacher's competencies in implementing education for sustainable development				
5	**Education of future teachers in education for sustainable development** *DES objective: Teachers have the qualifications needed to promote the specific competencies in the field of sustainable development in their students, as well as to support their school's orientation towards sustainable development.*	3/5	Ter	Quant
6	**Networks for actors in the field of education for sustainable development** *DES objective: Opportunities to exchange experiences and knowledge about the implementation of education for sustainable development are taken advantage of.*	3/5	Prim Sec I+II Ter	Quant Quali
Orientation of educational institutions to sustainability				
7	**Reporting on the orientation of educational institutions to sustainability** *DES objective: Educational institutions account for their orientation to sustainability in all fields of action.*	5	Prim Sec I+II Ter	Quant Quali
Establishment of education for sustainable development				
8	**Research and development in education for sustainable development** *DES objective: Education for sustainable development is an established field of scientific research.*	su-per	Ter	Quant
9	**Political will to implement education for sustainable development** *DES objective: There is a continuous and binding governmental policy towards education for sustainable development at a national and a sub-national level.*	su-per	Prim Sec I+II Ter	Quali
Societal awareness of sustainability				
10	**Awareness of the issue of sustainability in society** *DES objective: Sustainable development is a topic in society.*	su-per	–	Quant

6.1. Education in specific competencies in the field of sustainable development

I 01 Competencies in the field of sustainable development

DES objective	Function 3
Everyone has, during their school (and vocational) education, the possibility of acquiring competencies in the field of sustainable development.	Education in specific competencies

Underlying assumptions and considerations for the operationalization

For a universal education in competencies in the field of sustainable development, governmental requirements are necessary. These requirements are given, for example, by setting educational standards or by defining general learning objectives. These standards or learning objectives should refer to scientifically based models of incremental competence that are derived from the idea of sustainability and that reflect the requirements accompanying this idea. Such governmental requirements can also be given by defining lists of topics to be addressed and the like. As it has to be seen which aspects of sustainable development these topics explore and how the selection is justified, it has to be explained how these topics refer to sustainability.

Through lists of topics, timetables for subjects, description of competencies, learning objectives or educational standards, (national) curricula and the like define both explicitly and implicitly what takes place in a classroom and how the overall time allotted for teaching is divided among particular subjects and topics. This always expresses the relative importance of subjects, topics and competencies. The relative importance is seen in the proportion of teaching time spent on them (e.g. for all school years), even if this is not declared in the (national) curriculum.

Competencies in the field of sustainable development are given due importance in actual teaching when the acquisition of these competencies becomes part of the student's assessment.

Criterion 1	Application in	CH	D	A
Requirements concerning the acquisition of competencies in (national) curricula or in educational standards that are derived from the idea of sustainability.	Level	Primary Secondary I+II	Primary Secondary I+II	Primary Secondary I+II
	Location	Input	Input	Input
	Characteristic	Qualitative	Quantitative	Qualitative

Criterion 2	Application in	CH	D	A
Requirements defining sustainability-relevant topics* to be addressed in teaching or criteria for the selection of topics in (national) curricula or in educational standards that are derived from the idea of sustainability.	Level	Primary Secondary I+II	Primary Secondary I+II	Primary Secondary I+II
	Location	Input	Input	Input
	Characteristic	Qualitative	Quantitative	Quantitative

Given the current state of development of models of incremental competence for education for sustainable development, only input criteria can be formulated. As a complement to the competence-related input criterion, an appropriate quantitative output criterion could be formulated if instruments for measuring competencies would be at hand and became part of established surveys. In the interim a binary evaluation of the following question could be useful: "Are there instruments for assessing competencies in the field of sustainable development at hand that refer to scientifically based models of incremental competence of education for sustainable development?"

*The list of "key themes of SD" that is part of the UNECE indicator 2.1, sub-indicator 2.1.1, could be of use in identifying sustainability-relevant topics in applying the indicator (see Appendix C).

I 02 Teaching materials for education for sustainable development

DES objective	Function 3
Teachers have the possibility to implement education for sustainable development without additional time and cost.	Education in specific competencies

Underlying assumptions and considerations for the operationalization

Education for sustainable development is more likely to be practiced in the classroom when it does not cause additional preparation time for the teacher (i.e. when the time spent in preparation is considered as being within the normal range by the teacher). The availability of suitable, quality teaching materials facilitates ESD teaching and enhances its quality. These teaching materials should cover a broad range of topics so that teaching in the sense of education for sustainable development is not a one-off exercise.

Criterion	Application in	CH	D	A
Availability of teaching materials on a variety of sustainability topics*, which in their treatment of topics meet the requirements of sustainable development.	Level	Primary Secondary I+II	Primary Secondary I+II	Primary Secondary I+II
	Location	Input	Input	Input
	Characteristic	Qualitative	Qualitative	Qualitative

*The list of "key themes of SD" that is part of the UNECE indicator 2.1, sub-indicator 2.1.1, could be of use in identifying sustainability topics in applying the indicator (see Appendix C).

I 03a Sustainability study programmes in higher education

This indicator and indicator 3b, which is based on the objective of endogenisation, are alternatives.

DES objective	Functions 3/4
Society has individuals with a specialised academic education in sustainable development.	Education in specific competencies Education in competencies for concretized goals

Underlying assumptions and considerations for the operationalization

Academically educated individuals are part of a society's elite. They have considerable influence in determining whether certain concerns and considerations gain a foothold in society over the long term and are dealt with professionally. Established degree programmes in sustainability contribute to the formation of an elite of experts who introduce the knowledge and skills relevant to sustainable development in a variety of occupational areas and by doing so act as disseminators. Study programmes as a rule are established on a lasting basis and they need promoters who, according to the principle of the unity of teaching and research, also conduct research on sustainability. Thus, by capturing study programmes in sustainability, the institutionalised scientific involvement with sustainability is captured as well, since the establishment of a topic in science is discernible as a rule in its institutionalisation in teaching. Since study programmes are established on a lasting basis, there must also be institutionalised structures (e.g. corresponding professorships).

The education of teachers that is oriented not to sustainability but to education for sustainable development is captured in indicator 5, further education in indicator 4.

Criterion	Application in	CH	D	A
Graduates of Bachelor/Master's programmes as well as doctoral programmes in sustainable development.	Level	Tertiary		Tertiary
	Location	Output		Output
	Characteristic	Quantitative		Quantitative
Study programmes that explicitly contain the term 'sustainability' or 'sustainable development' in their name.	Level		Tertiary	
	Location		Input	
	Characteristic		Quantitative	

As the data available in the three countries are quite different, it is not possible to use the same criterion in all three countries.

I 03b Competencies in the field of sustainable development in higher education

This indicator and indicator 3a, which is not based on the objective of endogenisation, are alternatives.

DES objective	Function 3
Everyone with an academic education has competencies in the field of sustainable development.	Education in specific competencies

Underlying assumptions and considerations for the operationalization

Academically educated individuals are part of a society's elite. They have considerable influence in determining whether certain concerns and considerations gain a foothold in society over the long term and are dealt with professionally. If all academically educated individuals acquire competencies in the field of sustainable development, there is reasonable assurance that the idea of sustainability is introduced into all sectors of society. If respective programme elements (e.g. modules) are offered by specialised academic institutions, promoters are needed who, according to the principle of the unity of teaching and research, also conduct research on sustainability. Thus, by capturing study elements in sustainability the institutionalised scientific involvement with sustainability is captured as well, since the establishment of a topic in science is discernible as a rule in its institutionalisation in teaching. If programme elements are established on a lasting basis, there must also be institutionalised structures.

The education of teachers that is oriented not to sustainability but to education for sustainable development is captured in indicator 5, further education in indicator 4.

Criterion	Application in	CH	D	A
Elements of study established on a lasting basis that are explicitly related to sustainable development and have to be attended by all students.	Level	Tertiary		
	Location	Input		
	Characteristic	Quantitative		

I 04 Further education in sustainability or education for sustainable development

DES objective	Functions 3/4
All occupational areas provide further education and advanced vocational training that is professionally qualifying in the field of sustainable development or education for sustainable development.	Education in specific competencies Education in competencies for concretized goals

Underlying assumptions and considerations for the operationalization

Lifelong learning takes place when the competencies and degrees acquired serve as qualifications and help advance one's career. Graduates of further education and advanced vocational training offerings related to sustainable development (preferably with a certificate) act as disseminators who have a stimulating impact at their working place and perform important tasks in the implementation of sustainable development (respectively of education for sustainable development in the case of teachers). The existence of and the demand for such offerings are an indication of the importance these competencies have in society and in the vocational world.

Criterion	Application in	CH	D	A
Offerings in further education and advanced vocational training in the field of sustainability or of education for sustainable development.	Level	Tertiary		
	Location	Input		
	Characteristic	Quantitative		

6.2. Teachers' competencies in implementing education for sustainable development

I 05 Education of future teachers in education for sustainable development

DES objective	Functions 3/5
Teachers have the qualifications needed to promote the specific competencies in the field of sustainable development in their students, as well as to support their school's orientation towards sustainable development.	Education in specific competencies Implementation in educational institutions

Underlying assumptions and considerations for the operationalization

Teachers with a disciplinary and didactic education in education for sustainable development as well as in issues of school development as related to sustainable development are more likely to integrate education for sustainable development in their teaching, as they are also to support school development processes focusing on sustainable development, which in turn is beneficial for the implementation of education for sustainable development in the classroom. That all teachers receive such education is ensured when it is part of governmental requirements for teacher colleges and other educational institutions for teachers or for the exam and certification of future teachers.

It goes without saying that future teachers will only receive such education when their own teachers have mastered these skills. This is also fostered when the state requires teachers to be trained in education for sustainable development directly by setting requirements for the education of teachers or indirectly by defining (national) curricula. For education in education for sustainable development to be of high quality it is necessary that the educational institutions for teachers conduct research and teach in the field of education for sustainable development (and that competence centres and the like are set up).

For the orientation of schools and institutions of higher education to sustainable development see indicator 7.

Criterion	Application in	CH	D	A
Study programmes for teachers offering education in education for sustainable development of at least 2 ECTS points.	Level	Tertiary		
	Location	Input		
	Characteristic	Quantitative		
Federal states with legal requirements demanding teachers at the primary and secondary level to be educated in education for sustainable development.	Level		Tertiary	
	Location		Process	
	Characteristic		Quantitative	
Courses with relevance to education for sustainable development.	Level			Tertiary
	Location			Input
	Characteristic			Quantitative

Since the framework conditions for the education of teachers in the three countries is as different as the number of the corresponding study programmes, this indicator is differentiated at the level of the criterion for the three countries. While the criterion for Germany and Austria is limited to the education of teachers for schools offering general education, in Switzerland the criterion also includes the education of teachers for vocational education.

I 06 Networks for actors in the field of education for sustainable development

DES objective	Functions 3/5
Opportunities to exchange experiences and knowledge about the implementation of education for sustainable development are taken advantage of.	Education in specific competencies Implementation in educational institutions

Underlying assumptions and considerations for the operationalization

Exchange and the transmission of knowledge advance the implementation of education for sustainable development and the quality of its implementation. Networks enable and facilitate the access to experience and complementary knowledge, are an incentive to learning and thus generate collective learning effects in specific fields of application. They counter isolation, promote the diffusion of best-practice examples and support lobbying. Moreover they set standards, norms and rules and support innovative problem solving. Networks thus have a quality-assurance effect. State support in turn has a beneficial effect on the durability of networks and on the quality of how they moderate discourse. Institutionalised (i.e. established on a lasting basis and moderated) networks encourage in particular the exchange and transmission of knowledge. Networks serving the exchange and transmission of knowledge in the field of education for sustainable development can be targeted towards individuals or towards educational institutions.

Criterion 1	Application in	CH	D	A
Educational institutions cooperating in established education for sustainable development networks (including professional and academic associations).	Level	Primary Secondary I+II Tertiary	Primary Secondary I+II Tertiary	Primary Secondary I+II Tertiary
	Location	Process	Process	Process
	Characteristic	Quantitative	Quantitative	Quantitative

Criterion 2	Application in	CH	D	A
Organisation and structure of the education for sustainable development networks.	Level	Primary Secondary I+II Tertiary		Primary Secondary I+II Tertiary
	Location	Process		Process
	Characteristic	Qualitative		Qualitative

6.3. Orientation of educational institutions to sustainability

I 07 Reporting on the orientation of educational institutions to sustainability

DES objective	Function 5
Educational institutions account for their orientation to sustainability in all fields of action.	Implementation in educational institutions

Underlying assumptions and considerations for the operationalization

Educational institutions (e.g. universities) can develop a profile through an orientation to sustainability, e.g. by conducting corresponding audits. Efforts going beyond voluntary positioning can be expected when this is demanded by requirements and implementation is monitored, i.e. when educational institutions are regularly held accountable for their performance in this respect (for institutions of higher education e.g. as part of performance agreements, for schools e.g. as part of school inspections). A comprehensive orientation of educational institutions to sustainability (including the implementation in teaching) should not be a one-off action, but instead become an integral part of quality development and of reporting.

The quality of the orientation and reporting is ensured when they are based on aspects and criteria that are comprehensibly derived from a scientific analysis of the idea of sustainability, and when they include all the relevant fields of action for the educational institution (e.g. for universities also the area of research).

Criterion 1	Application in	CH	D	A
Requirements for reporting on the orientation to sustainability for educational institutions.	Level	Primary Secondary I+II Tertiary	Primary Secondary I+II Tertiary	Tertiary
	Location	Input	Input	Input
	Characteristic	Quantitative	Quantitative	Quantitative

Criterion 2	Application in	CH	D	A
Existence of sustainability reports open to the public that are derived from the idea of sustainability and encompass all fields of action of the educational institutions.	Level	Tertiary	Tertiary	Tertiary
	Location	Output	Output	Output
	Characteristic	Quantitative	Quantitative	Quantitative

Criterion 3	Application in	CH	D	A
Scope of content, informative value and quality of the sustainability reports.	Level	Tertiary	Tertiary	Tertiary
	Location	Output	Output	Output
	Characteristic	Qualitative	Qualitative	Qualitative

6.4. Establishment of education for sustainable development

I 08 Research and development in education for sustainable development

DES objective	Function
Education for sustainable development is an established field of scientific research.	Superordinate

Underlying assumptions and considerations for the operationalization

Education for sustainable development can only be advanced and maintained on a qualitatively high level if it is a topic of relevant research and development projects and if education for sustainable development is an established field of research (regardless of whether there are chairs or competence centres etc. for education for sustainable development). When research funding organisations themselves use education for sustainable development as a research descriptor to identify and quantify the funds they provide to this topic, then research on education for sustainable development has become established in the scientific system. The number of publications in a given area shows the scientific interest and is an indication that there is an on-going scientific debate on the topic.

Concerning research funding it is the funding provided by recognised funding organisations that is most interesting (Switzerland: e.g. SNSF, Germany: e.g. DFG, BMBF, Austria: e.g. FWF, BMWF, bm:ukk). These organisations have established scientific procedures for quality assurance.

Criterion 1	Application in	CH	D	A
Public funding for research and development projects in education for sustainable development (per year).	Level	Tertiary	Tertiary	Tertiary
	Location	Input	Input	Input
	Characteristic	Quantitative	Quantitative	Quantitative

Criterion 2	Application in	CH	D	A
Publications on education for sustainable development.	Level	Tertiary	Tertiary	Tertiary
	Location	Output	Output	Output
	Characteristic	Quantitative	Quantitative	Quantitative

Criterion 3	Application in	CH	D	A
Dissertations on education for sustainable development.	Level	Tertiary	Tertiary	Tertiary
	Location	Output	Output	Output
	Characteristic	Quantitative	Quantitative	Quantitative

I 09 Political will to implement education for sustainable development

DES objective	Function
There is a continuous and binding governmental policy towards education for sustainable development at a national and a sub-national level.	Superordinate

Underlying assumptions and considerations for the operationalization

Political concerns are more likely to be implemented when they are concretized in strategies, action plans etc. and are subject to regular progress reviews. Strategies and action plans for sustainability or for education for sustainable development at a national (and sub-national) level document the political will to implement education for sustainable development. This is strengthened by a universal and coordinated implementation of education for sustainable development and by coordination appropriate to each teaching level. To create structures for a coordinated implementation of education for sustainable development is a crucial prerequisite for its implementation.

Criterion	Application in	CH	D	A
Measures to implement education for sustainable development in strategies and action plans especially for education for sustainable development or in corresponding sections of strategies and action plans for sustainability.	Level	Primary Secondary I+II Tertiary	Primary Secondary I+II Tertiary	Primary Secondary I+II Tertiary
	Location	Context	Context	Context
	Characteristic	Qualitative	Qualitative	Qualitative

6.5. Societal awareness of sustainability

I 10 Awareness of the issue of sustainability in society

DES objective	Function
Sustainable development is a topic in society.	Superordinate

Underlying assumptions and considerations for the operationalization

Public awareness of the concerns and issues of sustainable development expresses the fact that the idea of sustainability is valued in society. The presence of sustainability as a topic in societal discourse indicates at least the degree of acceptance of education for sustainable development as a concern.

Criterion	Application in	CH	D	A
Public awareness and acceptance of the idea of sustainability.	Level	-	-	-
	Location	Context	Context	Context
	Characteristic	Quantitative	Quantitative	Quantitative

Chapter 7
List of participating experts

The individuals who took part in the expert interviews and/or in one of the expert workshops (see Section 4) are listed below.

Switzerland

Affolter Christine	National Coordinator ENSI
Bärtschi Regula	Federal Office for Spatial Development ARE, Section Sustainable Development
Bellini Enrico	Sanu – future learning ag
Bertschy Franziska Dr.	Pädagogisches Ausbildungszentrum IVP NMS, Institut Vorschulstufe und Primarstufe, Bereich Forschung und Entwicklung
Boesch Anne	Federal Statistical Office (FSO)
Bouverat Myriam	Foundation for Education and Development (FED)
Costantini Dagmar	Federal Office of Public Health (FOPH)
Diem Andrea	Swiss Coordination Centre for Research in Education (SCCRE)
Duttweiler Dani	Federal Office for Professional Education and Technology (OPET), Matters of Principle and Politics
Felder Sabine Dr.	Rectors' Conference of the Swiss Universities (CRUS)
Feller-Länzlinger Ruth	Interface – Institute of Political Studies, Education and Family
Frey Rahel	Swiss Conference of Cantonal Ministers of Education (EDK)
Grossenbacher Silvia Dr.	Swiss Coordination Centre for Research in Education (SCCRE)
Gujer Marianne	Alliance Sud - Swiss Alliance of Development Organisations
Hassler Peter Dr.	University of Applied Sciences of Special Needs, E-Learning/Quality
Hauser Benedikt Dr.	State Secretariat for Education and Research (SER), Education
Hupka-Brunner Sandra Dr.	University of Basel, Institute of Sociology
Jucker Rolf Dr.	Stiftung Umweltbildung Schweiz (SUB)
Künzi-Minder Regula	Swiss Federal Institute for Vocational Education and Training (SFIVET)
Kull Miriam	Swiss Coordination Centre for Research in Education (SCCRE)
Lausselet Nadia	Foundation for Education and Development (FED)
Liechti Valérie Dr.	Swiss Center of Accreditation and Quality Assurance in Higher Education (OAQ)

Maurer Stephanie	Swiss Center of Accreditation and Quality Assurance in Higher Education (OAQ)
Moser Francesca	Deutschschweizer Erziehungsdirektoren-Konferenz (D-EDK), Projekt Lehrplan 21
Münster Marc	Sanu – future learning ag
Mure Johannes Dr.	Federal Office for Professional Education and Technology (OPET)
Nagel Ueli Dr.	Federal Office for Professional Education and Technology (OPET)
Nater Sabine	The Union of Students in Switzerland (VSS-UNES)
Oswald Franziska	Foundation for Education and Development (FED)
Pohl Christian Dr.	Network for Transdisciplinary Research (td-net)
Ramseier Erich Dr.	Pädagogische Hochschule Bern
Rhyn Heinz Dr.	Swiss Conference of Cantonal Ministers of Education (EDK), Department of Quality Development
Schmid Annette Dr.	UNESCO Biosphere Entlebuch
Sieber Priska Prof. (PH) Dr.	University of Teacher Education Central Switzerland (PHZ Zug), Institute for International Cooperation in Education (IZB)
Steiger Beat	UNESCO Commission
Steinger Eveline	University of Teacher Education Central Switzerland (PHZ Zug), Institute for International Cooperation in Education (IZB)
Urben Léa	Swiss Conference of Rectors of Universities of Teacher Education (COHEP)
von Erlach Emanuel Dr.	Federal Statistical Office (FSO), Education System
Vonlanthen Martin	Swiss Federal Institute for Vocational Education and Training (SFIVET)
Wachter Daniel Dr.	Federal Office for Spatial Development ARE, Section Sustainable Development
Wilhelm Markus Prof. (PH) Dr.	University of Teacher Education Central Switzerland (PHZ Luzern)
Wolter Stefan C. Prof. Dr.	University of Bern, Centre for Research in Economics of Education
Zbinden Karl Dr.	Swiss Center of Accreditation and Quality Assurance in Higher Education (OAQ)

Germany

Bittner Alexander Dr.	DBU, Osnabrück (German Federal Foundation for the Environment)
Bolscho Dietmar Prof. Dr.	Leibniz University Hannover
Cathrine Caspari	Office of the National Committee Chairman in Berlin of the UN Decade
Dembski Nadine	University of Bremen

Demmer Marianne Dr.	GEW, Frankfurt am Main (Education and Science Workers' Union)
Drieling Jürgen	Programme Transfer 21 Lower Saxony, Westerstede
Erben Friedrun Dr.	Evangelische Trägergruppe für gesellschaftliche Jugendbildung, Berlin (Evangelical Group for Social Youth Education)
Heinrich Martin Prof. Dr.	Leibniz University Hanover
Kabisch Ute	Evangelische Trägergruppe für gesellschaftliche Jugendbildung, Berlin (Evangelical Group for Social Youth Education)
Kindervater Christina Dr.	Thuringian Ministry for Education, Science and Culture, Erfurt
Köhler Gerd	GEW, Frankfurt am Main (Education and Science Workers' Union)
Kopfmüller Jürgen	Research Centre Karlsruhe
Kühne Stefan	German Institute for International Educational Research (DIPF), Berlin
Kutt Konrad	Federal Institute for Vocational Education and Training (BIBB)
Laubenthal Ursel	Senate Office for Education, Science and Research, Berlin
Meyer Wolfgang Dr.	Center for Evaluation (CEval), Saarbrücken
Müller Joachim	Higher Education Information System (HIS), Hanover
Müller-Christ Georg Prof. Dr.	University of Bremen
Reichard Christa Dr.	Saxon Regional Conservation Foundation – Academy, Tharandt
Renner Alexander	Federal Ministry of Education and Research (BMBF)
Ritterhof Jürgen Dr.	Koordinationsstelle Umwelt Bildung Bremen (Environment and Education Centre Bremen)
Rode Horst Dr.	Leuphana University of Lüneburg
Roderich Henry	Georg Eckert Institute, Braunschweig
Rürup Matthias Vertr.-Prof. Dr.	University of Wuppertal
Schmidt Renate	Thuringian Ministry for Education, Science and Culture, Erfurt
Schröpfer Anke	Thuringian Ministry for Education, Science and Culture, Erfurt
Schütte Kerstin Dr.	Leibnitz Institute for Science and Mathematics Education (IPN) Kiel
Siege Hannes	Engagement-Global gGmbH – Service for Development Initiatives
Vießmann Peter Dr.	Ministry for Education, Science and Culture of Saxony-Anhalt, Magdeburg

Austria

Frei Evi Dr. MinR	Federal Ministry for Science and Research (BMWF), Vienna
Langer Markus Dr.	Environmental Education FORUM, Vienna
Loibl Marie Céline Dr.	Federal Ministry for Science and Research (BMWF), Vienna

Mader Clemens Dr.	Department of Geography and Regional Science, Karl Franzens University of Graz
Pfaffenwimmer Günther Dr. MinR	Federal Ministry for Education, Arts and Culture (BMUKK), Vienna
Rauch Franz ao. Univ.-Prof. Mag. Dr.	Institute for Instructional and School Development, Alpen Adria University Klagenfurt
Specht Werner Prof. Dr.	Bifie – Federal Institute for Educational Research, Innovation and Development of the Austrian School System
Steiner Regina Dr.	Environmental Education FORUM, Salzburg
Zimmermann Friedrich o. Univ.-Prof. Dr.	Department of Geography and Regional Science, Karl Franzens University of Graz

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Appendix

Appendix A: UNECE indicators (2009) and the ESD indicator set

Themes of UNECE indicators	UNECE indicators	ESD indicators
1 Ensure that policy, regulatory and operational frameworks support the promotion of ESD	1.1 Prerequisite measures are taken to support the promotion of ESD	
	1.2 Policy, regulatory and operational frameworks support the promotion of ESD	9 Political will to implement education for sustainable development
	1.3 National policies support synergies between processes related to SD and ESD	
2 Promote SD through formal, non-formal and informal learning	2.1 SD key themes are addressed in formal education	1 Competencies in the field of sustainable development 3a Sustainability study programmes in higher education 3b Competencies in the field of sustainable development in higher education 4 Further education in sustainability or education for sustainable development
	2.2 Strategies to implement ESD are clearly identified	9 Political will to implement education for sustainable development
	2.3 A whole-institution approach to SD/ESD is promoted	7 Reporting on the orientation of educational institutions to sustainability
	2.4 ESD is addressed by quality assessment/ enhancement systems	7 Reporting on the orientation of educational institutions to sustainability
	2.5 ESD methods and instruments for non-formal and informal learning are in place to support changes in knowledge, attitude and practice	
	2.6 ESD implementation is a multi-stakeholder process	
3 Equip educators with the competence to include SD in their teaching	3.1 ESD is included in the training of educators	5 Education of future teachers in education for sustainable development
	3.2 Opportunities exist for educators to cooperate on ESD	6 Networks for actors in the field of education for sustainable development
4 Ensure that adequate tools and materials for ESD are accessible	4.1 Teaching tools and materials for ESD are produced	
	4.2 Quality control mechanisms for teaching tools and materials for ESD exist	2 Teaching materials for education for sustainable development
	4.3 Teaching tools and materials for ESD are accessible	
5 Promote research on and development of ESD	5.1 Research on ESD is promoted	8 Research and development in education for sustainable development
	5.2 Development of ESD is promoted	
	5.3 Dissemination of research results on ESD is promoted	8 Research and development in education for sustainable development
6 Strengthen cooperation on ESD at all levels within the UNECE region	6.1 International cooperation on ESD is strengthened in the UNECE region and beyond	

The following indicator in the ESD indicator set does not have an equivalent in the UNECE indicators:
- Indicator 10: Awareness of the issue of sustainability in society

Appendix B: Areas of national and international educational indicators and the ESD indicator set

Ind. set / Area	OECD indicators 2008	Educational indicators CH (14.3.11)
Participation in education/ educational offerings	A1 To what level have adults studied? A2 How many students finish secondary education and access tertiary education? A3 How many students finish tertiary education? A4 How many students complete and drop-out from tertiary education? C1 How prevalent are vocational programmes? C2 Who participates in education? C3 Who studies abroad and where? C5 Do adults participate in training and education at work?	1 Number of pupils in compulsory education 2 Educational attainment of population 8 Average duration of preprimary enrolment 9 Expected duration of education 10 Entry rates into tertiary level A 11 Participation in lifelong learning 18 Rate of immediate transitions to upper-secondary education 19 Early school leaving 20 Rate of completion of higher education studies 23 Completed qualifications at upper-secondary level 24 Completed qualifications of professional education and training 25 Tertiary graduation rates 26 Degrees in mathematics, sciences and engineering
Competencies	A5 What can 15-year-olds do in science?	21 Basic competencies among youth 22 Competencies in the adult population

Educational indicators D (National educational report 2010)	Educational indicators A (2009)	ESD indicators
B2 Participation in education C1 Supply of early childhood education, care and upbringing C2 Participation in education by children in daycare facilities and daycare C4 Transition to school D1 Transition and transfer in schools D2 Special needs support D3 All-day education and care of school age children D5 Participation in out-of-school learning activities D7 School leaving with and without certificates E1 New entrants in vocational education – structural change in vocational education E2 Supply and demand in dual system of vocational training E3 Supply of training places in companies E4 Termination of vocational contracts F1 Transition to higher education F2 New entrants to higher education F4 Programme structure, length of study, non-completion in higher education F5 Graduations in higher education G1 Participation in continuing education and training G3 Vocational training offered by companies H2 Trends in educational participation, personnel and financial requirements until 2025 H3 Projections on manpower supply and demand for 2025	B1 Number of students in public and private schools by school type over time and school level B2 Number of students in public and private schools by federal state, school type and subject C2 Educational participation in initial training and lifelong learning by age group C3 Educational participation in secondary school by region of origin, age and gender C4 Transition from primary school to secondary level I and from secondary level I to secondary level II C5 Entry rate to higher education and prior education of entrants D1 Trend of successful completion of secondary school II by sex and school type D2 Graduation rate in middle and upper secondary schools by subject and gender D3 Proportion of good grades in middle and upper secondary schools by subject and gender D4 Percentage of school completion and retention D5 Completion of secondary level I by gender and in European comparison D6 Early school leavers by gender and in European comparison	3a Sustainability study programmes in higher education 4 Further education in sustainability or education for sustainable development
B3 Educational attainment in population D6 Cognitive competences	D7 Performance in efficiency comparison D8 Educational attainment of population in EU comparison and by age and gender E1 Early childhood language competence E2 Reading comprehension in primary school E3 Mathematics and natural science competence at end of primary school (TIMSS 1995 und 2007) E4 Competence in reading, mathematics, natural sciences in 15/16 year olds in longitudinal study E5 High-achieving students in basic competences E6 At-risk students in basic competences E7 Multiple classification of students in at-risk and high-achieving groups E8 Performance differences between schools – variation between and within schools E9 Performance, performance evaluation and selection E11 Motivation and attitudes of students F3 Competences of young people with a migration background	1 Competencies in the field of sustainable development 3b Competencies in the field of sustainable development in higher education

Ind. set / Area	OECD indicators 2008	Educational indicators CH (14.3.11)
Socioeconomic status	A6 What is the socio-economic background of 15-year-olds and the role of their parents? A7 Does their parents' socio-economic status affect students' participation in higher education?	29 Social mobility relative to level of educational attainment
Economic consequences of education/ returns to education	A8 How does participation in education affect participation in the labour market? A9 What are the economic benefits of education? A10 What are the incentives to invest in education? C4 How successful are students in moving from education to work?	27 Occupational status and level of educational attainment 28 Relative earnings by level of educational attainment
Educational expenditures/ investments	B1 How much is spent per student? B2 What proportion of national wealth is spent on education? B3 How much public and private investment is there in education? B4 What is the total public spending on education? B5 How much do tertiary students pay and what public subsidies do they receive? B6 On what services and resources is education funding spent? B7 How efficiently are resources used in education?	3 Human resources for science and technology 4 Public expenditure on education as a percentage of gross domestic product 5 Public expenditure on education as a percentage of total government expenditure 6 Public expenditure on education per student 7 Cantonal scholarships

Educational indicators D (National educational report 2010)	Educational indicators A (2009)	ESD indicators
A3 Change in family and life patterns G2 Social profile of participation in continuing education and training I3 Equal opportunity in education	F1 Comparison of performance of girls and boys F2 Family factors and school performance. Compensatory effects of schooling F4 At-risk groups and high-achieving groups by migration background F5 Performance, performance groups and selection F6 School pathway decision and school as well as family background F7 Educational status and educational background of parents in secondary level II F8 Access opportunities to upper secondary schools by socio-economic and regional background characteristics F9 Socio-economic background of students in universities and universities of applied sciences	
E5 Labour market outcomes of vocational training G4 Returns to continuing education and training I1 Education, economic growth and labour market I2 Individual benefit of education	D9 Employment and unemployment by educational level and in comparison with selected countries (25 to 64 years old) D10 Employment by subject and gender D11 Unemployment by subject and gender D12 Earned income in EU comparison by gender and educational level in 2005 D13 Returns on education by gender and educational level D14 Returns on education by subject and gender	
B1 Expenditure on education H2 Trends in educational participation, personnel and financial requirements until 2025	A4 Economic conditions and educational expenditure in EU comparison A5 Gross domestic product, government expenditure and educational expenditure B7 Public expenditure on education by educational level and in EU comparison B8 Trends and allocation of public expenditure on education by educational level B9 Public expenditure per student in 2006	8 Research and development in education for sustainable development

Ind. set / Area	OECD indicators 2008	Educational indicators CH (14.3.11)
Organisation of teaching/teaching and learning conditions	D1 How much time do students spend in the classroom? D2 What is the student-teacher ratio and how big are classes? D3 How much are teachers paid? D4 How much time do teachers spend teaching?	12 School class size 13 Teacher/student ratio 14 Cultural heterogeneity in compulsory education 15 Selection at lower-secondary education 16 Grade retention during compulsory education 17 Assignment rate to special needs classes and schools
Evaluation practice	D5 What is the impact of evaluations and assessments within education systems?	
Education system	D6 Who makes the decisions in education systems?	
Context		

The following indicators in the ESD indicator set do not have an equivalent in the national and international educational indicators:

- Indicator 2: Teaching materials for education for sustainable development
- Indicator 5: Education of future teachers in education for sustainable development
- Indicator 6: Networks for actors in the field of education for sustainable development

Educational indicators D (National educational report 2010)	Educational indicators A (2009)	ESD indicators
B4 Pedagogical staff C3 Pedagogical staff in early childhood education D4 Pedagogical staff in school education F3 Quality of programme of study evaluated by students	B3 Gender distribution of students in public and private schools by school type and subject B4 Students with migration background in public and private schools by school type B5 Students with special education needs and not German as everyday language B6 Female teaching staff and female school principals by school type and subject C6 Student-teacher ratio by school type and subject C7 Student-teacher ratio by school type and over time C8 Student-teacher ratios in international comparison (OECD countries) C9 Differentiation in classroom and individual support E10 Match to school G1 School and classroom climate in international comparison as well as comparison between Austrian school types G2 Teacher, class and school climate from viewpoint of 15/16 year old students in Austria (PISA 2006) G3 Satisfaction with school G4 School stress: level and effects for 15/16 year olds G5 Violence and psychic aggression in school G6 Satisfaction of the population with the school system	
		7 Reporting on the orientation of educational institutions to sustainability
H5 Educational system under pressure to change	C1 Student movement at transition points in the Austrian school system G6 Satisfaction of the population with the school system	9 Political will to implement education for sustainable development
A2 Economic development and structural change	A1 Demographic trends by age groups and region of origin. Trend lines between 1985 und 2030 A2 Demographic trends by federal state and age groups. Trend lines between 1985 und 2030 A3 Socio-economic background of migrants to Austria	10 Awareness of the issue of sustainability in society

Appendix C: UNECE indicator 2.1.1 – thematic categories

Appendix I (a)

Indicator 2.1, sub-indicator 2.1.1

Please specify which key themes of SD are addressed explicitly in the curriculum/programme of study at various levels of formal education by filling in the table below.
(Please tick (V) relevant themes for each level. Use the blank rows to insert additional themes that are considered to be key themes in addressing learning for SD.)

Some key themes covered by sustainable development	ISCED Levels					
	0	*1*	*2*	*3*	*4*	*5*
Peace studies (e.g. international relations, security and conflict resolution, partnerships)						
Ethics and philosophy						
Citizenship, democracy and governance						
Human rights (e.g. gender and racial and inter-generational equity)						
Poverty alleviation						
Cultural diversity						
Biological and landscape diversity						
Environmental protection (waste management, etc.)						
Ecological principles/ecosystem approach						
Natural resource management (e.g. water, soil, mineral, fossil fuels)						
Climate change						
Personal and family health (e.g. HIV/AIDS, drug abuse)						
Environmental health (e.g. food and drinking; water quality; pollution)						
Corporate social responsibility						
Production and/or consumption patterns						
Economics						
Rural/urban development						
Total						
Other (*countries to add as many as needed*)						

NB: Your response will reflect the variety of ESD themes distributed across the ISCED levels. The distribution is more important than the raw number of ticks. The number of ticks may be used for your own monitoring purposes.

The scoring key for this table (max. 102 ticks; "other" not counted) is:

No. of ticks	0–5	6–10	11–25	26–50	51–75	76–100
Scale	A	B	C	D	E	F

Could you specify which specific themes are of critical important in your countries and why? Please specify for different ISCED levels, as appropriate.

UNECE-annex indicator 2.1, sub-indicator 2.1.1 (source: ECE/CEP/AC.13/2008)

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A majority of actors in politics and science stated that the idea of sustainability should be established in national education systems around the world. Practitioners, politicians and scientists all unanimously agree that simply taking action is not enough – it is also necessary to evaluate how successful efforts at reaching this goal have been. Subsequently a number of initiatives with the aim of developing relevant indicators started in different countries, including Switzerland, Germany and Austria.

The international research project "Development of Indicators to Evaluate Offerings and Performance in the Area of Education for Sustainable Development (ESD)" (2008-2011) is one of these initiatives. It was supported in Germany by the Federal Ministry of Education and Research (BMBF), in Austria by the Federal Ministry for Education, Arts and Culture (BMUKK) and in Switzerland by the State Secretariat for Education and Research (SER).

This book presents the theoretical foundations, methods and chosen results of this interdisciplinary project. The goal of the project was to present indicators that would allow to answer the question of whether and to what extent the idea of sustainability has been integrated in the education system for all levels of formal education, and not only at a national level in the participating countries, but also in international comparison. The work resulted in a set of ten ESD indicators, which due to a process of negotiation among actors from science, politics and practice has a broad foundation. The book provides a transnational description of the indicators and a description format to be used in their concretization for a given country. It thus provides a basis for the further implementation of indicators for education for sustainable development. The book is an extract of the project's results provided for the international expert conference in the aftermath of the project where the indicators were put up for discussion in a broader context. In the full version, available only in German, the indicators are concretized for the three countries participating in the project.

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