Competencies for ESD (Education for Sustainable Development) teachers

A framework to integrate ESD in the curriculum of teacher training institutes.

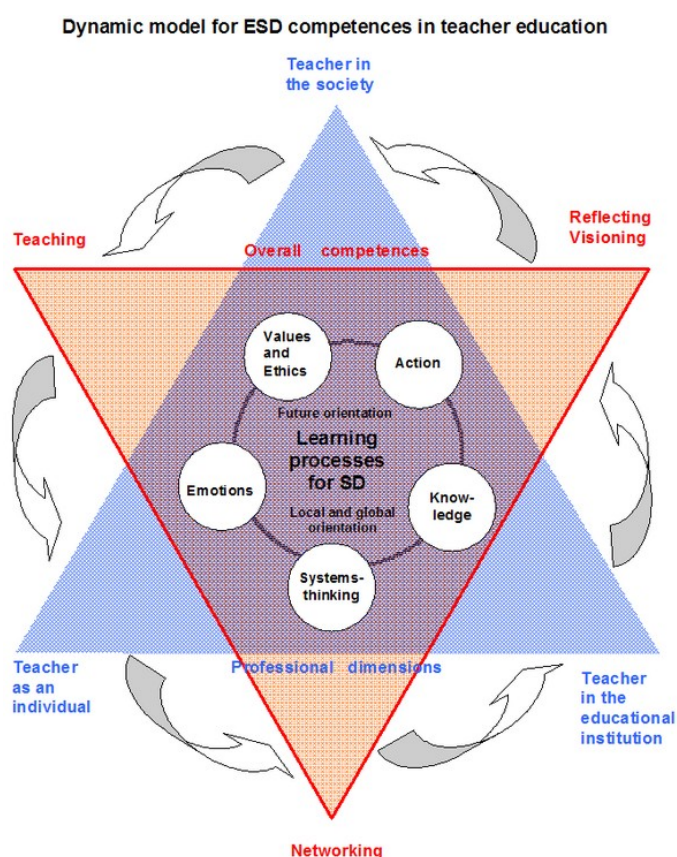Dynamic model for ESD competences in teacher education

Colophon

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About the CSCT-project and the partnership

About the CSCT

The CSCT project was developed as a response to the call of the UNECE Ministers of the Environment in 2003 for including education for sustainable development (ESD) in curricula from pre-school to higher and adult education.

In 2002 the international organisation ENSI (Environment and School *I*nitiatives) developed the Comenius3 project SEED, which aimed to identify the implicit and explicit criteria inspired by values of Environmental Education, as used to guide, support or award Eco-Schools involved in incorporating principles and actions for sustainability in whole school plans. This research also involved identifying and documenting innovative case studies in this area. The information is published in the SEED/ENSI publication: "A Comparative Study on Eco-school Development Process" (Mogensen & Mayer, 2005). Stimulated by the comparative study, a proposal for Quality Criteria for ESD-schools is published subsequently under the title "Quality Criteria for ESD-Schools: Guidelines to enhance the quality of Education for Sustainable Development" (Breiting, S., Mayer, M. & Mogensen, F., 2005).

ENSI considers action research as an important instrument for curriculum innovation at school level, both of compulsory education as of higher education, such as teacher education. In 2006 the ENSI publication 'Reflective practice in Teacher Education'[1] appeared which is structured around action research and evaluative case studies that focus on the aims of environmental education and action research as approach to develop teacher programmes for environmental education and education for sustainable development. After all, the integration of ESD in mainstream school curricula requires a thoroughly re-thinking of teacher training curricula.

The present Comenius-2-project, CSCT (Curriculum, Sustainable development, Competences, Teacher training) is an attempt to meet the call of the UNECE ministers of the Environment to offer curriculum models to teacher training institutes which are searching for attainable possibilities to integrate ESD in their curricula.

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[1] KYBURZ-GRABER, HART, P., POSCH, P. & ROBOTTOM, I. (Eds.) (2006) *Reflective practice in teacher Education*. Bern, Berlin, Bruxelles, Frankfurt am Main, New York, Oxford, Wien, 383 pp.

Within the ENSI family 15 partners, from 8 different countries, responded positively to the call which was clarified and discussed during the Comenius-2 contact seminar of 3-6 September 2003 in Szeged, Hungary. The department of teacher education of the Katholieke Hogeschool Leuven (Flemish Community of Belgium) was prepared to take the role of the coordinating institution.

An overview of the partners and their respective e-mail addresses is given below. More information about the project is available on the website www.csct-project.org.

We hope that the results of this project, together with the results of the SEED project and the ENSI publication on the reflective practice in teacher education, will contribute to the integration of ESD in mainstream curricula of both compulsory and teacher education.

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Sustainable development and education

Sustainable development

The Austrian film director Hubert Sauper describes in his film "Darwin's Nightmare" in a dramatic way how a non-sustainable process is deteriorating the region around Lake Victoria in many ways. The whole process started above all with the introduction of the Nile-perch in Lake Victoria and the exploitation through foreign companies. A complex system of a broad variety of factors interrelate with each other and are leading to the ecological, economical and social catastrophe in this region. The film provided a typical example of what is referred to today as a 'sustainability challenge'.

Fortunately there are also a growing number of international examples how to deal with such challenges in a sound way. Car-sharing cooperation e.g. are an example for the management of mobility. In Switzerland this bottom up-project started with small initiatives and developed to a nationwide organization. Advantages are visible in several domains:

- Ecology: reduction of grey energy of car-production, lower land use by parking lots and garages, availability of cars at numerous location, basically on railway-stations, you can use the train for larger distance.
- Economy: low costs for moderate users, creation of new jobs.
- Social: lower maintenance time, proliferation of the basic idea of sharing and how a society can organize this, less space for parking leaves areas to children to play.

This example shows how initiatives of small groups can initiate innovation. The same process could also be started by activities of schools.

What is sustainable development about?

In this chapter we will try to explain the meaning of sustainable development and describe its most obvious features.

One of the key features of the last decade has been the growing awareness of the process of globalisation. While only 13 articles about this topic were published between 1980 and 1984 the number of papers that refer to the same topic today, are almost uncountable (Dicken, 2003). Globalisation is manifesting itself on several levels: economic, ecologic and social. It is also becoming clearer to scientists and policymakers that these levels are strongly interconnected and are extremely complex. Globalisation offers many new opportunities but creates also new and often unexpected challenges and problems.

Furthermore, the impact for future generations may be very large but also very hard to estimate. The most famous problem considered from a global perspective is global warming. This problem has a clear ecological impact, but it also has significant economic implications. For instance, policy makers are now searching for alternatives to fossil fuel and they are considering options as diverse as nuclear energy and biodiesel. Both these options, however, will lead to new challenges: nuclear energy produces nuclear waste in the present and for future generations and centralizes economic power, while the increasing use of biodiesel may inspire many farmers to switch from growing plants which are used for food, to plants which produce oil that can be used as a fuel. Today, we feel the first effects as a dramatic rise of the food prices.

Global climate change can serve as a prototype of a sustainability problem, one which is characterized by a high degree of complexity, expressed by a strong interrelationship between ecological, social and economic dimensions, which have important consequences for future generations; furthermore there is the uncertainty about the routes that should be followed to find a solution.

Historical development of the concept of sustainable development

Club of Rome

In 1972, the Club of Rome shocked the world with the report 'The Limits to Growth'. The main conclusions of this report were that if economic-development-as-we-know-it continues, society will run out of non-renewable resources before the year 2072 with the most probable result being 'a rather sudden and uncontrollable decline in both population and industrial capacity'. It also argued that piecemeal approaches to solving individual problems would not be successful. Notwithstanding this report received a lot of critique, mainly because the predicted environmental disasters failed to occur.

Brundtland Report

In 1987 the World Commission on Environment and Development (WCED) submitted the report 'Our Common Future' to the United Nations General Assembly. This report is better known as the Brundtland Report, after the Chair of the Commission and former Prime Minister of Norway, Gro Harlem Brundtland.

The aim of the World Commission was to find practical ways of addressing the environmental and developmental problems of the world. In particular, it contains three general objectives:

- To re-examine the critical environmental and developmental issues and to formulate realistic proposals for dealing with them.

- To propose new forms of international co-operation on these issues that will influence policies and events in the direction of necessary changes.
- To raise the levels of understanding and commitment to action of individuals, voluntary organisations, businesses, institutes, and governments.

In this report the concept 'sustainable development' was defined as:

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

This definition sets out the two fundamental principles of intra-generational and intergenerational equity, and contains the two 'key concepts' of needs and limits. The concept of 'needs' demands that 'overriding priority' should be given to the essential needs of the world's poor, both from the North and South. Poverty and the unequal distribution of resources, the growing population and its expanding consumption are considered as major causes of environmental degradation: 'Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life' (WCED, 1987, p. 44). The Report stresses that these goals can only be achieved if consumption patterns in the richer countries are readjusted. Secondly, the concept of limits recognises that the current state of technology and social organisation imposes limits on the ability of the environment to meet present and future needs, so we must moderate our demands on the natural environment. Yet the Report rejects the anti-growth arguments of the 1970s, asserting that 'Growth has no set limit in terms of population or resource use beyond which lies ecological disaster' (WCED, 1987, p. 45). Indeed, Brundtland demands a revival of growth in developing countries to help alleviate poverty and provide for basic needs, although it seeks a more 'eco-friendly' type of growth that is 'less material- and energy-intensive and more equitable in its impact' (WCED, 1987, p. 52).

A central, distinguishing feature of sustainable development as a policy paradigm is that it shifts the terms of debate from traditional environmentalism, with its primary focus on environmental protection, to the notion of sustainability, which requires a much more complex process of trading off social, economic and environmental priorities.

Nevertheless, until today sustainable development is very often considered a synonym of protection of the environment (Evers, 2005).

United Nations Conference on Environment and Development, Rio de Janeiro 1992

The United Nations Conference on Environment and Development, which took place in Rio de Janeiro in 1992, and which was strongly influenced by the terminology that was introduced in the Brundtland report, was an important milestone for making the concept of 'sustainable development' more concrete (Scott & Gough, 2003). Besides the great

number of participants and the diversity of their origin, during the debates marked contrasts between representatives of the northern –generally richer- hemisphere and the poorer southern hemisphere came to the surface.

Representatives of the northern hemisphere were, in the first place, concerned about the growing importance of environmental problems which are a real threat for the ecosystems, while representatives from the developing countries were mainly interested in fighting poverty. According to the representatives of the developing countries, consumption patterns of people from the northern hemisphere are responsible for these problems and they condemn every imposed form of environmental control in the southern hemisphere, as this would restrict the already limited consumption possibilities of their inhabitants (Jackson & Michaelis, 2003). This discussion eventually led to the consensus that sustainable development should be considered as a domain of research and action and that it should be considered a wanted policy domain that we should aspire to (Elliott, 2006).

The results of the UN Conference which are most recognized by the large public are the *Rio Declaration on Environment and Development*, the *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, the *Convention on Biological Diversity* and the action programma of *Agenda 21*. Chapter 36 of Agenda 21 is dedicated to promoting education, public awareness and training.

Ten years after the top conference in Rio de Janeiro, a new conference was organised in Johannesburg, which was intended to stimulate the member states to make efforts to revitalize the agenda of sustainable development and to meet the challenges which emerged since the UN conference in Rio. Despite the high expectations regarding the conference, no new big agreements were made and only a new implementation plan was developed. However, the foundation was laid for a UN Decade for Education for Sustainable Development from 2005 to 2015. This resolution 57/254 was voted the 20th of December 2002. The UNESCO received the responsibility to promote the Decade and to develop an implementation scheme. This document served as the basis for the UNECE to develop an implementation strategy, which allows policy makers to design an appropriate strategy for their own state.

Features of sustainability challenges

Sustainability issues are intricate because social, economic and ecologic aspects are strongly interwoven. Simple predictions on the basis of linear causal relationships are therefore very rare. The following example may illustrate this.

People become more and more convinced about the fact that within a few decades we will run out of fossil fuels, which will undoubtedly pose enormous problems for the economic growth of many both developing and developed countries, and also impact on future generations. Consequently, there is a growing research activity, searching for alternative energy resources, especially for the transport sector where petrol is of vital importance.

Some plants that produce oil-bearing seeds can be used to produce a substitute for fossil fuel. The advantages are quite clear: theoretically it forms an unlimited source as it depends on solar energy, and it is CO2-neutral, which is in agreement with the Kyoto protocol. However, though at first sight this 'solution' might look very promising, rapidly it became obvious that it leads to very unsustainable developments too. Considering the economic importance of these fuels, it seems clear that big trans-national corporations will invest heavily in this sector. Growing plants require the availability of large surfaces of land, which become less available in industrialised countries, but are richly present in developing countries. Many policy makers expect therefore that particularly large areas of untouched natural reserves –such as the Amazon area- will be sacrificed to be used to grow maize or oil producing plants. Local populations, which strongly depend for their living conditions on the local biodiversity, will be the first victims of these developments. Furthermore, whilst the trans-national concerns will make significant profits from such operations the local populations will only benefit slightly, if at all, from the conversion of their original natural environment into large agricultural areas.

This example illustrates another feature of sustainability issues, viz. the uncertainty that policy makers meet when taking decisions with respect to them. After all, the ways to unsustainable solutions are usually well known, the ways to sustainable development however are covered with many uncertainties. Many solutions, which at first sight, look very promising, bear many risks both for the present, and the future generations. Therefore, sustainable development involves, by definition, a continuous learning process.

The risk society and the theory of reflexive modernisation

In 1992, the year of the UN conference in Rio, the English translation of Ulrich Beck's book '*Risikogesellschaft auf dem Weg in andere Moderne*', appeared as '*Risk Society: Towards a New Modernity*'. In this work, the author presents an analysis of the transition from the pre-industrial society, via the modern society to the second modernity (Beck, 1992). This analysis led him to describe the present society as a Risk society and to introduce the concept of reflexive modernisation.

Up to the first half of the 18th century, traditional communities existed in which traditional institutions, such as the church, the family, the village ... gave shape and sense to people's life. Gradually, and in the name of individual freedom and autonomy these traditional institutions and structures became less influential and were replaced by new ones: new industrial communities emerge and the tie with the family becomes restricted to a small number of very close relatives. The nation replaces the village and takes over part of the responsibility for the organisation of peoples' lives. In exchange for more welfare, people choose the organisations and structures to which they prefer to express their loyalty. At the same time science develops exponentially and individuals have an almost unlimited faith in new scientific knowledge. From the Industrial Revolution

onwards, educational systems in the industrialised world are increasingly designed stimulate economic growth (Wielemans, 2003).

The increasing large-scaled industrial activities cause side-effects which become obvious only many years later, for besides the negative impact on the natural environment - and consequently on people's health - the industrial activities threaten to exhaust the natural resources in the short or medium term. From the middle of the 20th century, these effects were clearly visible and for the first time, and from different sides, the alarm was given. It is clear from incidents such as the nuclear disaster at Chernobyl, from the many environmental disasters with oil-tankers and from the growing awareness of global climate change that the scale of environmental disasters is greater than ever before and that these disasters very often have a global character. Events in other fields such as crashes on the stock-market and the global risk of terror attacks demonstrate that we do live in a 'global village'.

Alongside the emergence of increasing risks, the end of the 20th century and the first part of the 21st century is characterised by a decreasing faith in scientific knowledge. More often, scientific studies contradict each other regarding the same issue as is clearly illustrated by the studies about the possible cause of global warming. For the average citizen, it becomes increasingly difficult to critically select from the impressive amount of information that reaches us. Furthermore, scientific knowledge is fallible, which makes every form of scientific knowledge more or less tentative and uncertain.

Ulrich Beck uses the concept of *reflexive modernisation* to describe the reflection on and the lack of scientific knowledge which characterises the present period.

Cultural theory as an interpretation framework for sustainability issues

Individuals will make interpretations of the environment, taking into consideration the aspects of uncertainty and the possible risks involved. The *cultural theory*, developed by Thompson and his collaborators (Scott & Gough, 2003), presents a useful framework to classify the different possibilities people use to make interpretations of their environment.

According to some sociologists, there are two dimensions along which people make interpretations of their environment: the first dimension relates to the degree people are convinced about the importance of individual actions or collaboration, and the second one relates to the degree people are convinced about the freedom they have to act (Gough, 2002). On the basis of these variables, four archetypes are distinguished: the hierarchical, the individualistic, the egalitarian and the fatalistic.

A hierarchical interpretation of the environment refers to little freedom of action and a strong emphasis on collective action as the best strategy to find a solution for sustainability challenges. The natural environment is considered a complex system which is strongly regulated by (natural) laws; these people are confident in science, which is –

according to them- able to unravel this complex system of (natural) rules and laws. As a consequence, this vision supposes behavioural rules, which lead automatically to pro-environmental behaviour when they are respected by the citizens.

The individualistic interpretation emphasises the importance of the freedom of action and advocates an individualistic attitude when confronted with sustainability challenges. For these people, the laws of the free market also apply to environmental matters; nature is considered in the first place, as a source which allows people to survive. The free market regulates the relationship between humans and the environment.

The egalitarian interpretation attaches much importance to the individual freedom people have to act and their focus on collective responsibility to find solutions for sustainability challenges. Local participative structures and organisations are therefore extremely important to reach their goals. They consider the natural equilibrium as very delicate, and believe that it can be disturbed very easily by human action. According to the egalitarian interpretation, principles of justice and equity are strongly linked to pro-environmental behaviour.

Finally, some people interpret sustainability challenges in a fatalist way as they believe the influence of the average civilian to change the existing situation is extremely small. Furthermore, sustainability challenges are not of first priority for these people.

Jackson and Michaelis (2003) use the same *cultural theory* to classify consumer behaviour with respect to the ongoing debate about 'sustainable consumption'.

The interpretations people make of their environment are socially influenced and can change from situation to situation, even within a short time span.

The *cultural theory* shows that people make interpretations of issues of sustainable development in different ways, and consequently there will be many different ways to find solutions. This diversity is the basis of the current pluriform society in which different visions with respect to sustainable development are present.

Reflexive modernisation and sub-politics

Starting from his theory of reflexive modernisation, Beck draws the conclusion that in the period of the new modernity political institutions become conscious of the uncertainty and the lack of scientific knowledge, which means that decision making today is always connected to a certain degree of uncertainty (Lijmbach *e.a.*, 2000). Besides this uncertainty, the new modern society is characterised by the absence of common norms and values which can be directional for decision making. This pluralism of norms and values results in people holding different interpretations on issues of sustainable development which leads to different solutions being proposed and to a range of diverse coalitions which support these different solutions. Beck calls this phenomenon sub-politics

and it is strongly connected to the disappearance of the monopoly of scientific knowledge as the main guide to finding solutions for sustainability challenges. The new societal structures have been shaped bottom-up as illustrated by the emergence of several organisations, characterised by flexible and dynamic structures and goals. These organisations are usually able to offer different solutions to those proposed by traditional bureaucratic institutions (Elmose & Roth, 2005). Each day new examples of sub-politics emerge. The most famous example is the response to globalisation, were so-called 'activists' have reacted by creating trans-national sub-politics of their own, with multi-issue agendas and diverse action repertoires as defining elements.

The theory of reflexive modernisation contends that western industrial societies have entered a second, reflexive phase of modernity. While first modernity has modernised tradition, second modernity modernises modernity itself.

Education for sustainable development

Societies generally expect educational systems to prepare young people for their future professional life and/or continued studies. The educational system is seen as having a socialising role and is expected to contribute to preparing young people to take up their responsibilities in helping to shape the complex society in which we all now live.

It is because of the latter reason that, by the mid sixties and early seventies, so-called adjectival educations –such as environmental education, health education, citizenship, peace education etc.- were introduced into the curriculum of many educational systems.

However, the risk society requires competences from their citizens which will markedly differ from the competences citizens needed about three decades ago. The introduction of issues of sustainable development in the curriculum of both primary and secondary education is therefore strongly recommended by several international organisations, such as UNESCO and UNECE.

Above, we described issues of sustainable development as complex, because of the tight connections between social, economic and ecological aspects, but also because many proposed solutions, may lead to new (global) risks.

This implies that education for sustainable development requires at least a holistic approach, rather than the reductionist approach which is common in traditional educational systems. Indeed, a reductionist approach can often be the origin of these problems. It follows that, if we desire a consensus rather than a (usually messy) compromise, then sustainability challenges need to be approached at a systemic level. (a.o. Sterling, 2001;Tilbury *e.a.*, 2005).

New challenges for education in a risk society?

Shifts in the curriculum are often the result of radical social changes or new societal challenges, which are considered as very important by the decision makers. Very often education is used by policy makers as an *instrument* to induce behavioural changes into a 'socially desirable direction'. The diversity of adjectival educations can be largely explained in this way. Therefore it is not surprising that some people think about introducing a new adjectival education, often called '*education for sustainable development (ESD)*'.

Most researchers who are involved with ESD hold that an instrumental vision on ESD by definition cannot be reconciled with the definition of education. In any case there is a strong consensus that schools are not organisations that can be used for solving societal problems (Jensen & Schnack, 1997; Scott, 2002).

According to Scott (2002), ESD should encourage schools to stimulate their pupils to reflect on their own lifestyle regarding sustainability issues. It implies that they should be able to reflect on the concept of sustainable development with respect to decisions they take in the context of their own life. Lijmbach e.a. (2000) consider the role of education as an instrument for the development of autonomously thinking persons. They strongly emphasise, together with other researchers (Rauch, 2004) a critical reflection of the different visions on sustainable development and even on the desirability of sustainable development.

Lijmbach e.a. (2004) consider education as 'life political formation' *("levenspolitieke vorming")*, aimed at bridging the gap between the way social institutions and organisations adapt to the present social and scientific complexity, changes and uncertainties and the way individual citizens deal with it.

This means that education –in general- should aim to help the student to (Lijmbach e.a., 2000):

- Autonomously reflect on and gain insight in his/her own and someone else's situation, and the degree to which these situations are interconnected and how they are determined.
- Learn to critically value situations.
- Learn to reflect autonomously about acquiring insight about possibilities and limits of personal and collective responsibility.
- Learn to critically reflect on possibilities to change or to maintain situations.
- Learn to make personal and social choices and learn to take responsibility for the choices they make.

Using Klafki's definition of *'Allgemeinbildung'*, Elmose and Roth (2005) formulate three competences, specifically aimed to deal with living in a risk society:

- The competence to understand and to change his/her own live conditions.
- Competence to participate in collective decision making.
- Competence to show solidarity with those who are unable to control their living conditions because of a diversity of reasons.

Education for sustainable development: a new adjectival education or a regulative idea?

For some researchers, involved with curriculum development, the prominent position of sustainable development on many national and international agendas is a sufficient reason to introduce a new and distinct adjectival education in the educational system.

However, there are enough reasons not to do so. The most important reason is that 'sustainable development' is a continuously evolving concept. Human relations with the environment are extremely complex and dynamic (Scott & Gough, 2003). People and organisations learn each time they have to adapt to the changing environment, and the environment responds to the changes of human behaviour and the activities which follow from these changes. Following Richard Norgaard, Scott and Gough (2003) this process is generally referred to as a co-evolution between the society and the environment. There does not exist a package of knowledge and skills, that when properly applied, leads automatically to a sustainable society.

Rauch (2004) considers 'sustainable development' as a regulative idea, which can be considered as an ideal people can strive for, but which inevitably can never be fully realised. Regulative ideas –such as justice, integrity etc.- serve as organisers to connect them with normative aspects, and therefore they are very useful as heuristic structures to reflect on. They give direction to research and learning processes and they can be seen as kinds of pre-concepts, without which no meaningful questions can be asked or problems can be identified.

Some authors consider sustainable development as a guide which is always present in the background and which gives direction when looking for solutions of sustainability issues (Kyburz-Graber, 2003).

In this sense, sustainable development can be considered an ethos that for every citizen, teacher and pupil should always be present at the back of their minds, when taking decisions, at least when they are convinced about the desirability of a sustainable society.

Therefore, existing adjectival educations can be used as entrances to approach issues of sustainable development. Environmental education emphasises environmental problems, but if teachers have the intention to take the issue of sustainable development seriously, they will also link the issue to the economic, social, cultural and political aspects.

Some teachers already made the link between these aspects, when dealing with issues of environmental education, even before the concept of sustainable development was raised in education.

Thus, although we do not advocate an independent adjectival education for sustainable development, the approach we recommend does mean that a teacher who consciously wants to deal with sustainability issues in the classroom, needs specific knowledge, skills and competences. Also new educational teaching and learning methods may facilitate ESD and in this way they can be used as a lever for educational innovations.

This is, amongst others, the major objective of ENSI, an international non profit organisation to introduce new educational methods and to stimulate new types of collaboration and the development of so called dynamic qualities of learners.

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How to read the model

CSCT framework
Dynamic model for ESD competences teacher education
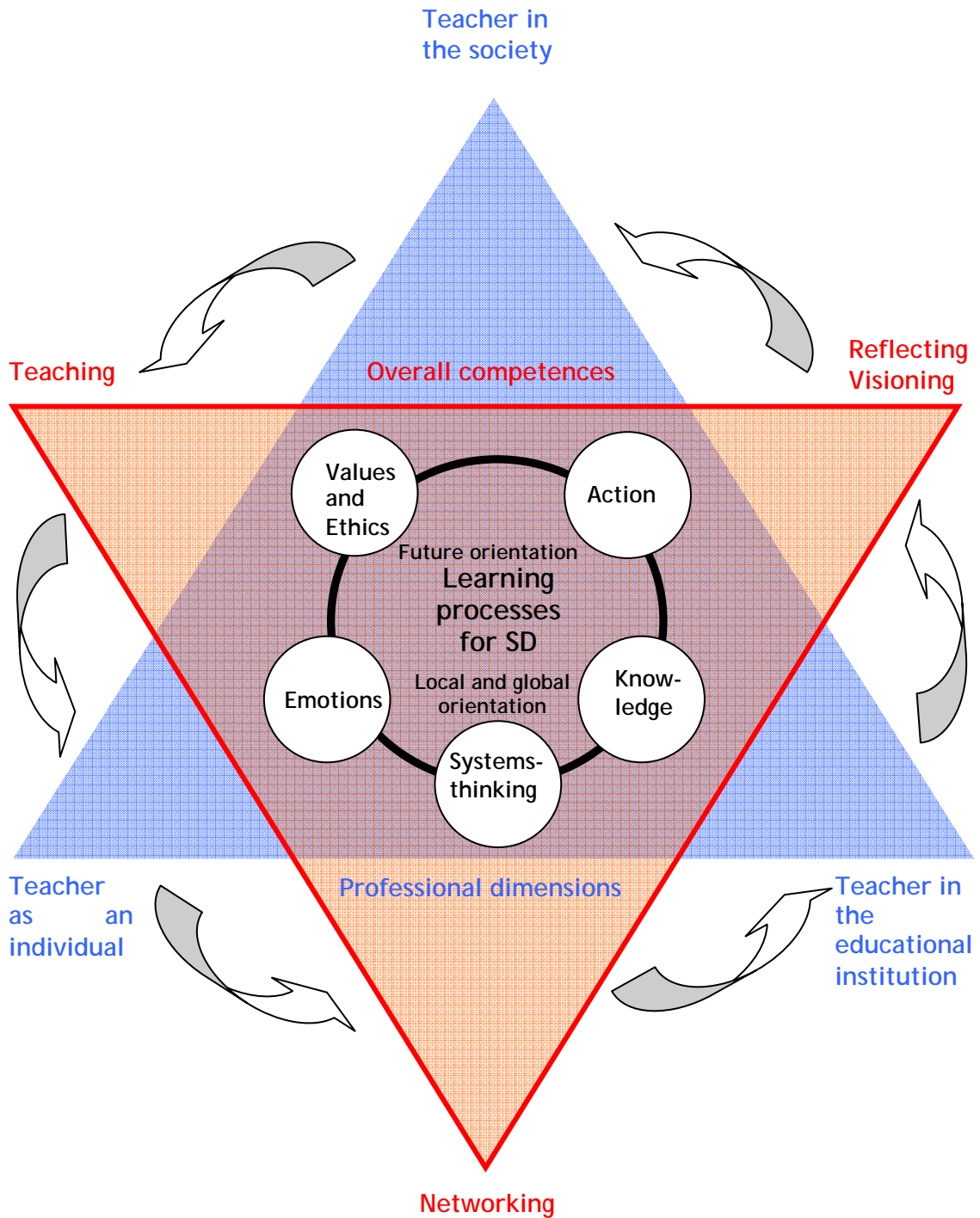
Blue triangle: Professional Dimension

We have to move beyond the idea of the teacher as an instructor. We rather have to envisage teachers as individuals who are in a dynamic relationship with their students, their colleagues and the wider society. It is within this dynamic relationship that we create the conditions that enable genuine learning to develop and progress in ESD. This means that teachers are no longer simply the communicators of knowledge, but members of an institution, which has a collective focus on the way all its members learn and develop, and all of those people are involved in the dynamics of a society that is seeking to confront the issues of sustainability. For all these levels teachers need specific competences, which are explained with the five domains. In addition to these overall competencies are needed.

Red triangle: Overall Competencies for ESD

There are three overall competencies:

- Teaching.
- Reflecting / visioning.
- Networking.

ESD needs a different and more constructive focus on *teaching*. Teachers have to gain the insight through constructivism, that acquiring competencies is a self-steered and active process, which can be fostered but not created.

For example communication, the first competence, needs to promote more of a balanced dialogue between teachers and learners and between learners themselves. This means that the traditional tasks undertaken by teachers such as teaching, instructing and communicating will change as ESD develops. Besides the communication within the educational institution publication of projects and efforts are crucial (exhibitions, theatres, songs, cabaret books, public media, web-pages …) so that parents and the community is invited to take part in this school-process.

The second two competences have even greater emphasis in ESD, because ESD has to take into account future orientation as well as local and global orientation. *Visioning* and creating new perspectives are important tasks because the transformative role of education is a key issue in ESD. Action will change as a product of *reflecting* and visioning, because such future action will take into account reflection on what has happened, and use this as a means to envision a transformation that will create new solutions and new ideas. Action research is an effective tool to foster such reflection and visioning in order to improve teacher competencies.

ESD as a common concern has to be realized within an interdisciplinary team. No one can do ESD alone, it is a common effort and everyone brings his or her strengths and weaknesses to the project. *Networking* with other partners in and out of school is also necessary in order to create a learning environment with an ongoing spiral containing, visioning, planning, acting and reflecting. ESD concerns real life problems and issues and requires the creation of learning opportunities in society. Also with networking publishing competencies are important (compare with the section on teaching).

Competences for communicating in an effective way and organizational skills are referred to in the blue triangle professional dimensions and not explicitly mentioned here.

How to read the model

The relationship between the professional dimensions and the overall competencies refer to all the possible combinations. The two triangles should be regarded as twistable. Opposite angles have the strongest relationship with each other.

Examples:

- The teacher in the educational institution needs especially competences in teaching, communicating and mediating on various levels such as: with students, teacher colleagues, leadership and educational board.
- But this is not sufficient. To do ESD you need as an individual teacher to be able to create and formulate visions based on reflective activities.
- The teacher and the educational institution are part of the society and there is always a given relation between the three. ESD requires openness, understanding and action, which are relying on competences such as networking, cooperating and publishing.

But also:

- The teacher has the competence of organizing and fostering networking while teaching through cooperation between classes and students of different levels.

Function of the five domains of competencies

In teaching and learning for ESD, all five domains (knowledge, systems thinking, emotions, ethics and values and action) have to be applied to each of the professional dimensions and they also relate to all overall competences.

Finally the content of ESD has to be related to the future development and to local as well as global context.

We invite you to look at some of the case studies to find out which domains are especially fostered on the different professional levels but also in connection with the overall competencies.

Development of the dynamic model for ESD competences in Teacher Education

The CSCT competence model was developed by the whole international group in a three year long process both at workshops and discussions at the meetings and in between. The following pages show three main steps of the competence model developed at the meetings in Szendendre (Hungary) 2005, Barcelona (Spain) 2006 (Spain) and Leuven (Belgium) 2007. The meeting in Klagenfurt (Austria) 2007 was more oriented towards the case studies.

A comparison of the three stages might show inter alia:

- The second and third versions differentiate between the core elements of competences in ESD and framework aspects like overall competences and general professional dimensions of teacher work.
- This is a trial to structure the many elements which seem important for ESD and make the chart clearer to the reader although it is hard to make complex inter-relations easily readable.
- In the last version we tried to combine the images of structure (triangles) and dynamic features (errows). This refers to the theoretical concept of the model: competences for ESD in teacher education have to develop while planing, implementing and reflecting initiatives. For this process the modell offers guiding elements or reference points.

The central element is learning for Sustainable Development. The group was quite clear about this core principle when talking about competences for ESD already at the Fano meeting 2005. This elemend „survived" changes of the charts.

Szendendre 2005: Clusters for developing competences for ESD

Connected to area 1

Connected to area 5

Teacher Education
COMPETENCES
METHODS

1
Values
Ethics

5
Action

Social
justice

AREAS,
ASPECTS

CONTEXT

Economical
efficiency
and
innovation

LEARNING
PROCESS
FOR SD

Ecological
viability

Cultural context

2
Emotions

Good governance
of Institutions

4
Knowledge

Connected
to area 2

Connected
to area 4

3
Reflection

Connected
to area 3

(Criteria/indicators)

Assessment

Barcelona 2006: CSCD Competence Modell

Communication

Organisation

Values

Action

LERNING ESD on ecology, social justice, economy, good governance

Emotions

Know-ledge

Systems-thinking

Reflection
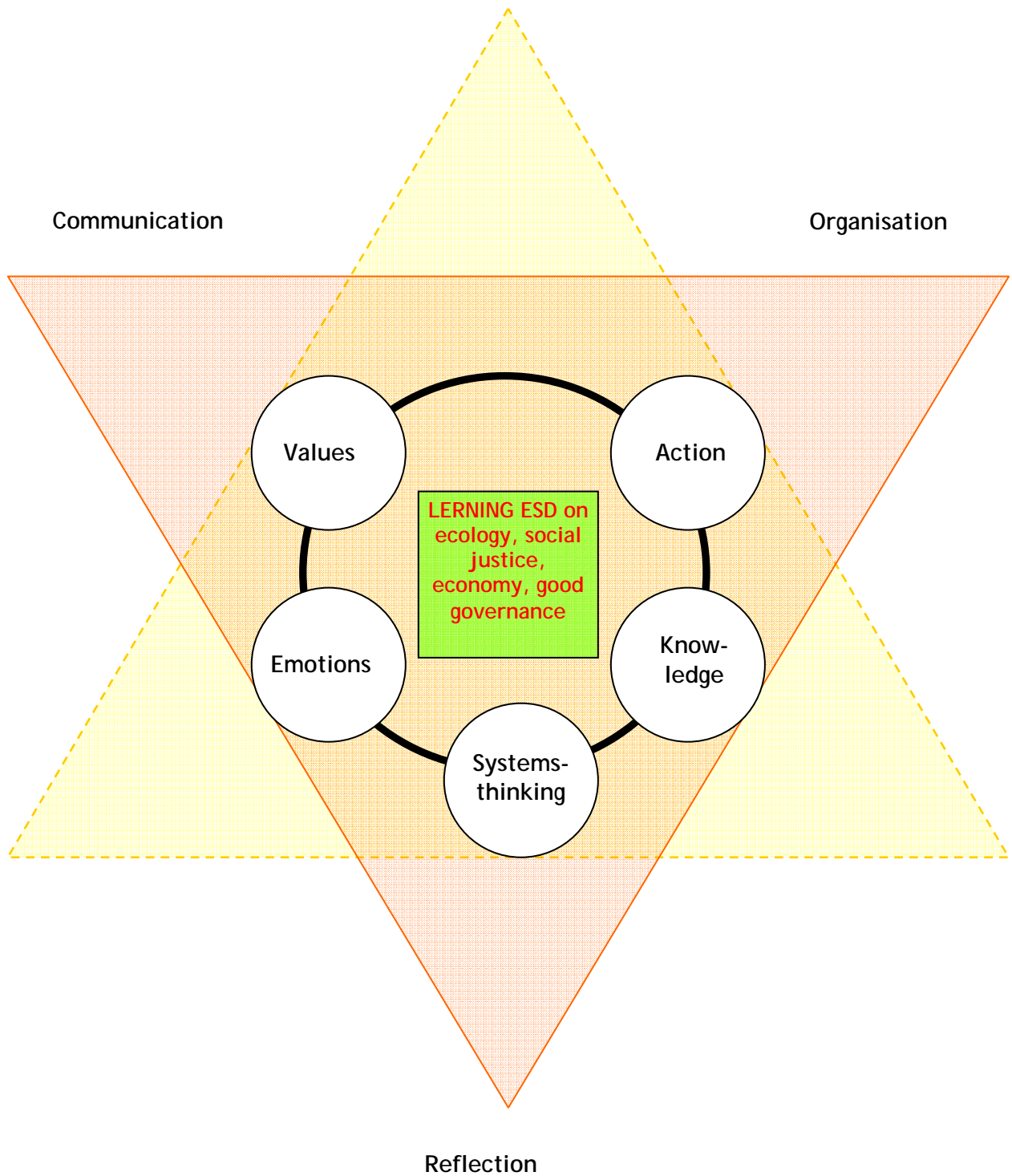
Leuven 2007: Dynamic model for ESD competences in teacher education
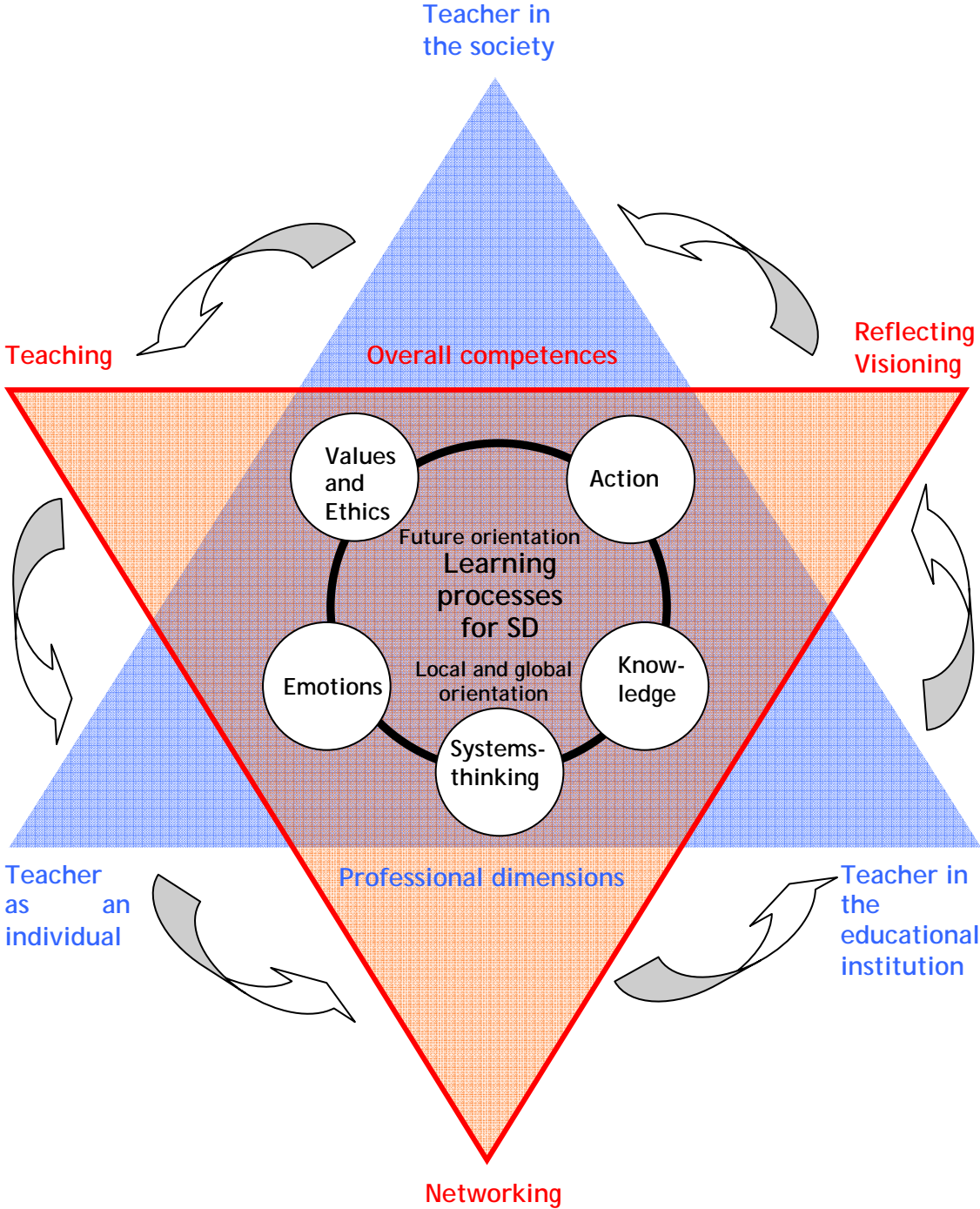
Competence Concept

The concept of 'competence': from input tot output oriented

This text is mainly based on the concept of 'competence' developed in: RAUCH,F., STEINER, R., & STREISSLER, A. (2007). Kompetenzen für Bildung für nachhaltige Entwicklung von Lehrpersonen: Entwurf für ein Rahmenkonzept. [*Competences for education for sustainable development for teacher students: a conceptual framework*]. In: B. BORMANN, & G. de HAAN (Eds.), Kompetenzen der Bildung für nachhaltige Entwicklung. Operationalisierung, Messung, Rahmenbedingungen, Befunde (S. 141-158). Wiesbaden: VS Verlag. (In German).

The competence concept has been object to discussion for a long time. Particularly, the switch from input to output orientation, with the aim to measure educational gains has been discussed. Educational planning of contents and methods (input) by the teachers for the learners cannot be done anymore without stating which learning goals are to be aimed, which competences (output) the learner should acquire and how these goals and competences can be reached. This shift of paradigm is strongly related to the economic thinking by the educational policymakers about the concept of accountability, which gave origin to league tables of schools and universities and the audit cultures. Two important examples, which confirm this trend, are the PISA and TIMSS comparative studies.

Competences and education of learners

The last years there is an ongoing discussion about output oriented models and about basic competences for teachers. The reason for this focal shift was the insufficient quality of teacher education. For example, Hascher & Altrichter (2002) describe teacher education in Austria as a 'conglomerate of unconnected knowledge'.

Some research projects about teacher education clearly show that teaching, which is the core business of the teacher, often receives much less attention compared to domain knowledge, such as biology, geography etc. Often, the content of a course is strongly influenced by the lecturer's preference and is not necessarily oriented towards the future praxis of the teacher student (cf. Oelkers & Oser, 2000; Oser, 2002; Terhard, 2002).

In recent discourses about educational research, it is frequently reported that the message of professionalism about the core business of education insufficiently reaches the teacher student. While there is a growing consensus about the meaning of learning competences as a prerequisite for educational quality, the integration of co-responsibility for school development and for further development of professionalism is a rather new phenomenon.

Krainer (2003) introduces four dimensions for professionalism –action and reflection, autonomy and networking – which help to grasp the actual trend for more team and project work, involvement of parents and the school environment, even as more cooperation with partner institutes and professional communication. Also Stern and Streissler (2006) found in their empirical research project about professional development of Austrian teachers in the domain of natural sciences, that in the different areas of action of the teachers very different competences are needed. While in the classroom pedagogical, psychological and didactic skills are important, in the school and the community, teamwork, cooperation, school development and public affairs play an important role. Reflection on the teacher's actions, conscious steering of his/her own professional development, 'reflection' about work attitude and reflection about the concept of education, are also features of the professionalism of teachers.

Problem fields of the concept of 'competence'

When dealing with the concept of competence some problems are encountered: the concept of competence has been used in different ways. In the Austrian discussion about education, competences were understood as key qualifications, social competences, 'soft skills', cross-curricular competences or 'dynamic skills' (Lassnigg, Mayer & Svecnik, 2001). Often the concept of competence was confused with 'qualification' or 'standard'.

The OECD (2005) differentiates between three categories of competences:

- key competences for the interactive use of tools, such as knowledge, media and resources;
- the competences for acting autonomously;
- competences for interacting within socially heterogeneous groups.

The necessity to think and act in a reflective way is considered a central element in this competence. Reflexivity does not just mean the skill to act routinely when dealing with a particular situation, but also to deal with changes, to learn from experiences, and to think and act critically (OECD, 2001).

In the UNESCO report *'Learning: the treasure within'* (UNESCO, 1996), Jacques Delors (1996) recognizes four pillars for education of 21st Century: learning to know, learning to do, learning to be and learning to live together. They partly correspond with the frequently used competence fields: domain competences, methodological competences, personal competences and social competences (Erpenbeck & Rosenstil, 2003).

De Haan (2001) introduced the concept of '*Gestaltungskompetenzen*' ('shaping competence') and made it a central concept of the BLK-21[2] programme in Germany.

Gestaltungskompetenz refers to the skill of applying knowledge about sustainable development and recognizing problems about non-sustainable development. This means, being able to draw conclusions about ecological, economic and social developments and their mutual dependency, based on analyses of the present and studies about the future; and starting from these conclusions he/she should also be able to take decisions which he/she can bring into action politically both as an individual and as a member of a community.

Weinert (2001) is warning of two 'assumptions': that a small set of key competences is sufficient and the gain of a broad knowledge becomes obsolete and secondly that the new skills can be used automatically on the 'right' place. This refers to the problem of transfer: to which measure is it possible to transfer qualifications, acquired in one particular situation, to another situation?

A fourth problem relates to the focus on the individual who should acquire competences during his or her whole life time in order to exist in the neo-liberal labour and community model. This view tends to require a 'shift of responsibility' to the individual. Structural aspects and particularly poor learners in the 'mainstream' educational system and in the system of further education are not supported. Without changing the priorities on the systemic level of the educational system, the acquisition of certain competences, such as interdisciplinary thinking and teaching or skills such as communication and project management, remain an 'accidental' side product of the educational system, instead of putting them more central for all teachers and learners by changing the curricula and the introduction of new teaching principles or the reinforcement of already existing teaching principles.

A fifth problem arises out of the norm setting of the concept of competences. Even when curricula and teaching principles are reoriented from input to desired outputs, it doesn't tell anything about the actual practice of the teachers and learners. As long as the educational culture -and in particular the assessment culture- will not change, the concept of competence will remain a modern meaningless phrase.

Furthermore, competences do not exist for themselves but always as a look to a wanted outcome.

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[2] BLK: Bünd-Länder Kommission (Bund-Länder Commission for Educational Planning and Research Promotion)

Competences are also social constructs, which are based on values and ideological assumptions (Rychen & Salganik, 2003). Defining competences is also an ethical and political assignment. A possible consequence may be that the competence oriented approach prescribes unintended or intended paradigms of the neo-liberal market and the Western community systems.

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Five domains

five crucial perspectives on competencies in education for sustainable development

Our concept of competences

Since several years the term „competence" is used in an inflationary way and without distinctive differentiation, not only within the working context or in the connection with educational issues but also in personal and societal everyday life.

The definition of what is hidden behind the term of competency proves to be enormously difficult, and moreover different terms often are used synonymously.

Rychen & Salganik (2003), editors of the final report of the OECD-project „Defining and Selecting Key Competencies" (DeSeCo), who designed a conceptual framework for the definition and evaluation of key-competences, state: „In public discourse and sometimes also in specialized literature, there is a tendency to use terms such as skills, qualification, competence, and literacy either imprecisely or interchangeably, in order to describe what individuals must learn, know, or be able to do to succeed in school, at workplace, or in social life." (Rychen & Salganik 2003, p. 41). They specify the concept of competence as "the ability to successfully meat complex demands in a particular context through mobilization of psychosocial prerequisites (including both cognitive and non-cognitive aspects" (ibid), and as a „complex action system encompassing cognitive skills, attitudes, and other non-cognitive components" (ibid, p.51).

Rychen and Salganik also point out the danger of reducing the competence concept to only one of it's dimensions, as it often happens when assessing competences in school tests as well as in large-scale assessments, where it is traditionally restricted to cognitive components. Competent performance or effective action implies the mobilization of knowledge, cognitive and practical skills as well as social and behavior components such as abilities, emotions, and values and motivations. A competence – as a holistic notion - is therefore not reducible to its cognitive dimension (Rychen & Salganik, 2003).

According to Jacques Delors (1998) in the UNESCO-Report "Learning: The treasure within", learning is based on the aspects learning to know, learning to do, learning to live together, learning to be, as the four pillars in education for the 21st century.

Competencies are described as learnable but not teachable. This leads to the increasing relevance of the question of whether and how they may be acquired via learning programs (Weiner 2001, p.52f). There is a distinct connection between competency concepts, educational framework conditions, training of teachers and shaping of learning processes.

Competence-oriented educational concepts focus on output of the aspired educational processes whereas conventional syllabuses and didactic approaches focused on input, which meant contents and subjects, which pupils should study. The output approach on the other hand asks not what should be taught, but what should be learned, what abilities for acting, which concepts and problem-solving strategies people should have acquired as a result of the learning process. The acquisition of competences is hardly comparable with learning as knowledge acquisition. Therefore it helps to focus on action competence and prevent the mere accumulation of "inert knowledge" (Weinert).

McKeown (2002) differentiates in her ESD toolkit between „knowledge, skills, perspectives, values, and issues". According to her, these components are to be taken into consideration when restating curricula in the sense of ESD.

As a basis for the competence model of CSCT we take the extended definition of Franz E. Weinert, as is has been adopted by the DeSeCo Project (Weinert 2001, p. 27f, and Rychen & Salganik 2003, p.41f, Klieme et al 2003, p. 21f). We especially esteemed the connection of a demand oriented or functional approach with the internal structure of a competence, but also, that competences are context dependent.

„The theoretical construct of action competence comprehensively combines those intellectual abilities, content-specific knowledge, cognitive skills, domain-specific strategies, routines and subroutines, motivational tendencies, volitional control systems, personal value orientations, and social behaviours into a complex system" (Weinert 2001, S 51).

Competencies don't exist per se but always relate to a certain desired output. One can focus on the functional approach when defining competencies: the result an individual achieves through an action, a choice or a way of behaving, in connection with the demands of the particular profession, social role or personal project (e.g. the ability to cooperate). This demand-oriented approach has to be combined with and complemented by the definition of the internal structure of a competence, as "internal mental structures in the sense of abilities, dispositions, or resources embedded in the individual" (Rychen & Salganik 2003, p.44). This would include all knowledge, cognitive skills, practical skills, attitudes, emotions, values and ethics, and motivation, which is related for instance to the ability of cooperation. "Without research on internal structures, no barriers can be provided against the temptations an traps of mere 'ability-to' expressions" argue Witt and Lehmann (2001, p.5). The identification of the internal structure of a competence can help to define the prerequisites for the gaining the competence, to create tasks and manuals for learning the competence, and identify necessary learning conditions.

In addition it is important to take into consideration the context dependency of a competence. Individuals do not act in a social vacuum, Action always takes place in specific and various social and socio-cultural fields. In the holistic and dynamic model of competence underlying the DeSeCo project competencies are not regarded as existing

independently of action and context. Instead, "they are conceptualised in relation to demands and actualised by actions (which implies intentions, reasons, and goals) taken by individuals in a particular situation" (Rychen & Salganik 2003, p.47).

For the formulation of competencies in relation with ESD we have to be attentive not to focus only on personal abilities and motivations, but also on surrounding frame conditions. Supporting structures have to be created in which the competencies can be used.

Since competencies are very complex and manifest themselves only in actions and behaviour in certain contexts, the application of competencies can only be observed and measured indirectly. Also, we must consider that a single competency may be realised differently due to different support and thus inside another environment. Implications for the measurement of competencies therefore are, that we must draw conclusions about the underlying competencies and the connected attributes indirectly. Moreover, since competencies are supposed to prove themselves in a context-overlapping manner, they cannot be measured by single, isolated performances. Evidence of competence can only be gathered by observation in varied situations. (Rychen & Salganik 2003, p.48).

For ESD another facet of the notion of competence is crucial. ESD is a common social project. No single person can have all needed competences alone. The conception of collective competencies serves the demands of ESD far better. According to the "strength model" (McKeown 2002) the different and various competencies and strengths of individuals and disciplines should contribute to ESD and the UNESCO named "partnership and networks" as one of the seven strategies of the DESD. Division of labour, distribution of resources and to take into account the dialectical relationship between the competencies of individuals and the structural and institutional characteristics of the context can meet the complex acquirements of Sustainable Development and of ESD.

The five domains of competencies of the CSCT-Model

Planning the teaching, reflecting the educational work, visioning the profile and performance of your school, looking for partners outside the school — it all needs a set of basic angles to consider for fostering a successful education for sustainable development. For each of these perspectives it needs a set of competences, which are crucial for effectively managing the process.

We identified five competence- domains, of which each must have a specific profile for ESD. Even though these domains may appear as separate elements in the graph, they interact intensively and are in reality inseparable. Therefore overlapping was inevitable. By decision we allocated the different competences to only one of the domains.

Our model of competences is based on a theoretical background as well as on experiences of all participants of the project. Actually there are very few sources listing competences

for teachers specifically. Exceptions are ENSI SEED QC, WWF Pathway…. Various sources in the literature dealing with ESD suggest the categories "Knowledge – Issues – Skills – Perspectives – Values" or similar (UNESCO Implementation Scheme, ESD toolkit, UNECE) which is another system of categories than our five domains.

The following short description introduces the reader to the five domains.

Knowledge

As specific features of knowledge for ESD we defined: conceptual, factual and action related knowledge. Knowledge has to relate to time (past – present – future) as well as to space (local – global) and it is inter-, trans-, pluri- or cross-disciplinary constructed. Knowledge is constructed by each individual and has developed with all the experiences in each life and thus you also have to take into account the social structure of knowledge. The viability of our knowledge determines its quality. Today viability should be linked to responsibility for the nature will not be exploited any more (see ethics an values). Critical thinking is indispensable.

Systems thinking

The complexity and interconnectedness of today's world asks for thinking in systems. There is an increasingly shared view, that analytical thinking and reductionist thinking are not sufficient to envision a sustainable future or to solve the current problems. Different kinds of systems are addressed: biological, geographical, ecological, political, economical, social, psychological ... including interrelationships in time and space. It implies the awareness of being part of the living system "earth" in space and time.

Emotions

Thinking, reflecting, valuing, taking decisions and acting are inseparably tied with emotions. Emotional competence is therefore indispensable for ESD-commitment and processes. Empathy and compassion play thereby a key role.

Feeling inter-connectedness with the world is basic for intrinsic motivation in ESD.

Ethics and Values

Norms, values, attitudes, beliefs and assumptions are guiding our perception, our thinking, our decisions and actions. They also influence our feelings. The main guiding principle of ESD is equity (social, intergenerational, gender, communities …). Equality between man and nature is explicitly included only in some SD-concepts. The „Earthcharter" (www.earthcharter.org), officially recommended for ESD by the UNESCO is an exceptional

example for a declaration of fundamental ethical principles for building a just, sustainable, and peaceful global society for the 21st century.

Action

Action is the process, where all the competences of the other four domains merge to meaningful creations, participation and networking in SD. It needs additional special practical skills, abilities and competences in the field of project management and cooperation.

All four levels of action have to be considered for a successful ESD: individual, classroom/school, regional and global. Actions allow to experience conflicting interests, change, to be involved (participation), learning from mistakes, synergies and success. All of them can increase motivation for further learning and continuing action if they are chosen wisely. Actions allow applying the solidarity developed through empathy and compassion.

For each of these five domains we developed competences on three different levels:

- The teacher as an individual – connected with reflection and visioning
- The teacher in the educational institution – connected with teaching and communication
- The teacher in the society – connected with cooperation and networking

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Competences related to Knowledge

Definition of knowledge

The following types of knowledge applied by teachers are today widely recognized amongst educational researchers (Shulman, 1986, 1992; Cochran, 1997) and are used here as a framework to classify the different competences regarding the knowledge dimension of the CSCT conceptual framework:

- Content knowledge (CK), which encompasses the theories, principles and concepts of a particular discipline (Shulman, 1986). Applied to SD, this category refers to knowledge about issues such as climate change, poverty distribution, desertification …, but also understanding of inter- and intra-generational solidarity, the principle of precaution etc.
- Pedagogical knowledge (PK) which refers to the general knowledge teachers have about instructional methods.
- Pedagogical content knowledge (PCK), the type of knowledge which is unique to teachers and which is based on the manner in which teachers relate their pedagogical knowledge to their subject matter knowledge. This type of knowledge refers to the manner teachers transform and represent subject concepts and ideas in such a way that they make sense to their pupils or students. Several studies show that most novice teachers struggle with this type of knowledge (Cochran, 1997).

As pedagogical knowledge refers to general knowledge about instructional methods etc., which do not refer specifically to ESD, we do not deal with this type of knowledge in this project. Of course, it does not mean that pedagogical knowledge is not important for teaching SD issues; but we think that the reader can find sufficient information about it in specialized articles and books.

Theoretical background

Knowledge building

Knowledge building is considered from a constructivist perspective. This means that aspects of information processing are combined with motivational issues such as volition and self-directed learning (Phye, 1997), which is also expressed in the CSCT conceptual framework. However, as especially for ESD motivational issues are considered of extreme importance for the construction of personal knowledge, they were included in the framework as separate dimensions and therefore, they are not included in this chapter.

Knowledge dimensions

If the main goal of ESD is the development of teachers' students' and their pupils' competences which enable them to find possible pathways for solutions for SD challenges, then it follows automatically that the knowledge they need is action-oriented and that it will involve an interdisciplinary connection between environment, people, culture and society (Jensen & Schnack, 1997; Jensen, 2002). Jensen & Schnack (1997) distinguish 4 dimensions of knowledge people need when they are motivated to find solutions for environmental problems; we translate them here for SD problems:

- Knowledge about the existence and spread of sustainability issues, such as the relation between CO_2 and global warming, the occurrence of poverty and its causes etc. This knowledge is essential in order to stimulate interest and to rouse concern, creating the starting point for a willingness to act. But the same authors warn, that this knowledge may have an adverse effect if it is learned in isolation, as it may create a growing concern amongst students that the issues are too complex and too large and this will lead to 'action paralysis'.
- The second aspect deals with knowledge about the causal dimension of SD problems, knowledge which mainly belongs in the sociological, cultural and economic spheres. This includes knowledge of social organization, of economic organizations such as IMF, Worldbank, … and the role they play in SD issues.
- The third dimension deals with knowledge about indirect and direct possibilities for action; according to Jensen and Schnack, this knowledge dimension is central to an action-oriented form of ESD and usually belongs in psychological, political and sociological spheres.
- The fourth dimension deals with the necessity of developing one's own vision on SD and ESD.

Position within the CSCT concept

Teacher training today is still strongly influenced by the so-called technocratic model, which can be roughly summarized as follows:

- Knowledge is considered by both the teacher and the learner as unproblematic.
- Emphasis in teacher training is on technical expertise and mastering of domain knowledge.
- Curriculum is build around a set of practices which result in measurable learning effects.
- The competences and skills are not connected to the ethical and social context.

The emancipatory model considers teachers as individuals who are able to deal critically with the present reality and have the desire to improve this reality.

In this model, the teacher has the role of an intellectual who can contribute to active citizenship and to the development of a democratic society. According to critical pedagogues such as Giroux and McLaren, education should take a critical position towards the dominant powers in the society. As a consequence teachers should be equipped with competences which allow them to deal with the tension between the existing and the desirable reality.

Almost by definition, teaching for SD can only be approached according to the emancipatory model.

The competences of a teacher are strongly influenced by the beliefs and values he or she has. SD issues are nearly always controversial and involve value judgments which cannot be settled by (scientific) evidence alone (Summers e.a., 2005). For example, a teacher who is convinced that global climate change is a natural phenomenon which is not influenced by human activities will probably not encourage her/his students or pupils to participate in local Agenda 21 or other activities that focus on reducing CO2 emission. Or a teacher who believes that SD challenges can only be resolved on a high policy-making level, and therefore believes that citizens have no role to play in SD debates, will probably not stimulate his/her students or his pupils to take actions for SD.

Of course, teachers' values and beliefs are strongly reflected in their personalities and identities. Tickle (1999) states that the 'teacher as a person is the core by which education itself takes place'.

It is also the case that controversial SD issues generally provoke strong emotional reactions: we can think of the heated discussions between nature conservationists and project developers, between proponents and opponents of globalization etc. It is inevitable that many students will also have strong views on such issues, and teachers should help their pupils or students to deal with these concerns and emotions (Sterling, 2001).

The examples above demonstrate the link between knowledge and action. By action new knowledge is built but in order to act people call on knowledge.

Sustainable development issues are complex as they require not only good general problem solving skills, but also high levels of expertise in a broad range of knowledge domains. In addition, finding ways to possible solutions also requires from the problem solver the competence to identify and to connect the ecological, economic and social dimensions of the problem. This aspect relates knowledge to systems thinking, which is often reflected in attempts at interdisciplinary teaching and learning.

Specific aspects of content knowledge for SD relate to issues such as uncertainty, complexity, risk, society, system thinking and to the interconnectedness between social, economic and ecological dimensions. Furthermore, knowledge should be action-oriented

(should contribute to the action competence of students) and value based. It should take into account the spatial (local/global) and time (past, present and future) dimensions.

Teachers have responsibilities with respect to their pupils or students, towards the school and educational community and towards society.

For each of these responsibility levels, competences and sub-competences were formulated with respect to content knowledge and pedagogical content knowledge:

Teacher as a guide of learning processes

- The teacher is able to acquire relevant and embodied knowledge about SD challenges and issues.
  - ο The teacher knows the concepts of SD and ESD and the most relevant national and international policy documents relating to SD and ESD.
  - ο The teacher has mastered SD key concepts and knowledge (cf. table 1).
  - ο The teacher is able to value knowledge as the result of cultural heritage and is able to critically reflect on it.
  - ο The teacher is able to help students to distinguish between factual knowledge and opinions.
- The teacher is able to select educational goals for SD, taking into account the developmental stage and the prior knowledge of the pupils or students, and the diversity within the group of learners.
  - ο The teacher is able to identify locally and globally relevant SD issues and to connect the local and global aspects of the issue involved.
- The teacher is able to create a powerful learning environment for teaching SD issues.

The teacher as a member of the school and the educational community

- The teacher acquires sufficient knowledge of relevant SD issues in order to contribute to the construction of a curriculum that integrates SD into the whole school curriculum.

The teacher as a member of the society

- The teacher is able to find partners outside the school community and to co-operate with organizations which promote sustainable development.

Table 1. Key concepts with respect to ESD (Huckle, 2005)

- Interdependence of society, economy and the natural environment, from local to global (chain reactions, multiple causes and multiple effects, trade offs).
- Citizenship and stewardship (rights and responsibilities, participation and co-operation).
- Needs and rights of future generations.
- Diversity (biological, social, economic and cultural).
- Quality of life, equity and justice.
- Development and carrying capacity.
- Uncertainty and precaution in action.

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Teacher Competences related to Values and Ethics

Definition and basic terms

Values

Values are certain beliefs, attitudes or convictions that are reflected in our personal behaviour. They are influenced by a variety of factors such as ideology, religion, gender, class and culture, personal experiences of life or reason, all of which help to form our perceptions of the world.

Values are an orientation towards all major areas of human concern, from religion to politics to economic and social life. They are the centre of who you are and what you are, they define you as a person.

Values have three important characteristics:

1) Values are developed early in life and are very resistant to change.

2) Values define what is right and what is wrong (intrinsic).

3) Values themselves cannot be proved correct or incorrect, valid or invalid, right or wrong. If a statement can be proven true or false, then it cannot be a value.

Hans Ruh (2006), professor for social ethics, lists the following basic values of a European ethic: justice, life, human dignity, dignity of creation, freedom, sustainability, trust, forgiveness, peace and meaning.

While the internalised values of individuals are important, the organization has a major impact on the behaviour of its members, and can have a positive or negative influence on their values.

So how do *values* relate to *ethics*, and what do we mean by ethics?

Values are what we, as a profession, judge to be right." Individually or organizationally, values determine what is right and what is wrong, and doing what is right or wrong is what we mean by ethics. To behave ethically is to behave in a manner consistent with what is right or moral. What does "generally considered to be right" mean? That is a critical question, and part of the difficulty in deciding whether or not behaviour is ethical is in determining what is right or wrong.

Ethics

In ESD we focus on normative aspects, on how we act in the world, on how we behave towards the world and others and what moral values underlie our behaviour. This includes areas such as philosophy, law, economics, and social and political theory.

A vision of fundamental ethical principles for building a just, sustainable, and peaceful global society for the 21st century is listed in the Earth Charter (www.earthcharter.org). This document was created as an ethic framework for Agenda 21 by the largest global consultation process ever associated with an international declaration. The charter is officially recommended for ESD by UNESCO. It is translated in 30 languages and offers various teaching materials.

Another helpful document supporting a world-ethos for a peaceful and just future, is the "Explanation to the World Ethos" by Küng and Kuschel (1993), published by the parliament of the world religions.

Norms

The standards we have in relation to the broad range of issues we face in society which then influence how we act in various areas - social, political, economic, religious etc. Moral judgements that define wrong and right behaviour, the allowed and the disallowed, what is wanted and not wanted within a culture.

Hans Ruh defines basic norms of a European ethic as follows:

Reverence for life, reverence for all things developed in a long time, avoidance of suffering and damage, protection of basic life resources, responsibility for general welfare, treating similar things in a similar way, fair trade, balancing inequities that are not ones own fault, willingness to perform, help in cases of misery, solidarity, participation.

Morals

Morals have a greater social element to values and tend to have a very broad acceptance. Morals are far more about good and bad than other values. We thus judge others more strongly on morals than values. A person can be described as immoral, yet there is no word for them not following values.

Beliefs

Beliefs are convictions about what we are doing, what is of worth, why we are doing it, and what the effect will be.

Attitudes

Attitudes refer to a complex mental state involving beliefs and feelings and values and dispositions to act in certain ways (e. g. "he had the attitude that work was fun").

Assumptions

Assumptions or suppositions are subjective perspectives/theories which can be obstacles for new learning experiences.

Position within the CSCT framework

Values and emotions are closely related to each other: emotions always have a valuing character and values or valuing is always also emotional. In most definitions of "values" emotions play a subsidiary role. Most theories are dealing with the structure of the values-system and not with the interrelationship between values, emotions and regulation of acting. There is a need for further research in this field. (Schmitz, 2000).

The importance of values are defined as crucial in various educational contexts, especially in connection with ESD:

"ESD is fundamentally about values, with respect at the centre: respect for others, including those of present and future generations, for difference and diversity, for the environment, for the resources of the planet we inhabit. Education enables us to understand ourselves and others and our links with the wider natural and social environment, and this understanding serves as a durable basis for building respect."

(United Nations 2004, p. 4.)

"The school curriculum should pass on enduring values … and help [learners] to be responsible and caring citizens capable of contributing to a just society. It should develop their awareness and understanding of, and respect for, the environments in which they live, and secure their commitment to sustainable development at a personal, local, national and global level "

(Scott 2002)

A teacher-training institute engaged in ESD therefore has to enclose in the curriculum activities of clarifying and negotiating values and in constructing new ones.

The Shell-Youth-study (1997) proved that not the idols and values have been disappeared among youth, but the hope, that they will be fulfilled. The main task of schools is not primarily to raise the hope again but explain the function of values and idols: to think

critically about reality (von Hentig, 1999). Values therefore are an important part of the construction of critical thinking.

ESD is explicitly founded on values and rationality. They have a major impact on the way we act. If we share the value of having respect for the diversity of human beings, we must practise this value accepting the existence of other values. Values cannot be easily changed. One of the challenges of working with student values is on one hand to clarify and make explicit personal values while on the other hand giving the space for other beliefs. We think that teachers should, whilst participating in a process of clarification, also have to investigate their own beliefs and assumptions. Uncertainties and tensions are elements of ESD and should not paralyse education but support it.

Ethics can be introduced in a rather pragmatic way starting at the age of 10 by using examples of the everyday life. Only after puberty it is possible to make it a subject of systematic exploration (von Hentig, 1999).

Four conditions have to be fulfilled so that working with these topics is effective: the issues have to be meaningful to teacher and students; nothing which should remain comes fast; all learning has to be combined with experience; the person of the teacher has to be involved – he/she is the strongest instrument (von Hentig, 1999).

Competences

1) Teacher as an individual

- The teacher should be able to clarify (making implicit beliefs explicit) his/her own beliefs, assumptions and values related to Sustainable Development, Education and learning.
- The teacher should be able to encourage students to question their beliefs and assumptions in order to clarify their thinking.
- The teacher has to be aware of societal tensions including conflicting interests and also the positive trends in the society related to SD and education, so that they can anticipate changes and the consequences of action.
- The teacher has to be able to analyse the underlying structure and the reasoning which supports this, thus allowing both themselves and the students to participate in the decision making processes of the society they inhabit.

2) Teacher in the educational institution

- The teacher is able not to impose his/her own values and opinions allowing students to hold their own positions.
- The teacher is able to modelling values of respect and dignity which underpin sustainable development, in personal and institutional life.
- The teacher is able to helping learners gain plural perspectives on issues.

- The teacher is able to making the assumed norms explicit so that they can be examined, debated, tested and applied.
- The teacher is able to helping learners develop critical understandings of sustainable development.
- The teacher is able to focusing on students clarification and discussion of their own values.
- The teacher is able to offering students opportunities to appreciate and confront diversities and to look at them as opportunities.
- The teacher is able to working with contradictory beliefs, assumptions and values as well as moral dilemmas.
- The teacher is able to offering opportunities to students to distinguish between factual knowledge and value-based opinions and to investigate the beliefs and interests behind them.
- The teacher has knowledge about a range of teaching/instructional methods/materials related to values (what, how, when) i.e.:
  o research based learning.
  o real life learning.
  o project learning.
  o role play games.
  o discussion forums.

3) Teacher in the Society

- By focussing on students' clarification and discussion of their own values the teacher is able to ameliorate mutual respect and understanding.
- Teachers need to be aware that values can not simply be applied but are developed through an ongoing and context-sensitive process.
- Teachers should be able to focus on understanding the concept of European citizenship, including the rights and responsibilities it confers.
- The teacher is able to cooperate to bring about structural or institutional change within society so that efforts can be embedded within the mainstream. ESD must go beyond individual self-development to promote structural social change.
- The teacher is able to use existing regional, national and international policy framework, non-governmental organisations and networks for ESD to build common understandings, to identify common challenges and to strengthen common commitment in order to plan joint actions.

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Systems thinking

Definition and basic terms

Complexity is increasing in today's world and a policy for sustainable development needs strong solutions to cope with this fact. Our dilemma in dealing with this complexity emerges when we define simple cause-effect relationships and draw simple and logical conclusions, which only exist in theory. In reality a fundamental change in seeing and perceiving the world is necessary in order to solve the current complex tasks and problems and to prevent future ones: We need a systemic way of thinking, reflecting, visioning and acting. Systems thinking investigates patterns, connections and relationships between elements (Vester 2004). This way of thinking is crucial with regard to the importance of retinity, participation and anticipation in sustainable development.

The main characteristics of systems thinking were developed simultaneously in different disciplines during the last century. Biology and especially ecology had pioneering tasks but also in disciplines as diverse as psychology, philosophy, quantum physics, organic biology, cybernetics this kind of thinking was developing. Fields of application reach from control engineering to communication theory from sociology to economy and schools.

Systems thinking emphasizes patterns and relationships rather than isolated elements or parts. In consequence each individual is always connected in various ways to its environment – is always a part of it.

Some relations of systems thinking to ESD

The awareness, that human beings are part of the infinite "sub-systems" of our Earth, part of "the global system as a whole" and dependent on it in so many ways, is central to ESD. This awareness needs to encompass ecology, economy and society.

Anticipation: Through looking and thinking ahead of present time or looking at the present time from the perspective of the future, it is possible to create visions which are a specific element in ESD. In this regard it is also important to look at evolution, at our history, to look back where we are coming from and to imagine where we want to go.

Creativity: It is necessary to invent new solutions to problems, with new ways to cooperate with our Earth's systems. Through the efficient flow of information, sophisticated communication and a careful way of handling information in a (e.g. social) system, its creativity is enhanced and new properties can emerge.

Definition of systems thinking

„Systems thinking is about gaining insights into the whole by understanding the linkages and interactions between the elements that comprise the whole 'system'. Consistent with systems philosophy, systems thinking recognizes that all human activity systems are open systems; therefore, they are affected by the environment in which they exist. Systems thinking leads to recognition that, in complex systems, events are separated by distance and time; therefore, small catalytic events can cause large changes in the system. Systems thinking acknowledges that a change in one area of a system can adversely affect another area of the system; thus, it promotes organizational communication at all levels …"This Wikipedia-definition seemed to us very helpful introduction.

'Systems thinking' is often used as a synonym for networked thinking, holistic thinking, cybernetic thinking or complex problem solving.

For a more detailed definition we refer in the following to expert statements.

First some key terms for living systems are explained:

- Wholeness: the whole is more than the sum of the elements and has a different quality than the elements themselves.
- Holon: each system is whole (a holon) but simultaneously part of a bigger system (Koestler, 1984). Everything is linked to everything.
- Open systems: they have a constant flow of energy, matter and/or information and therefore are able to maintain a balance (feedback loops and interdependency).
- Homeostasis: ability of self regulation to maintain a dynamic equilibrium.
- Autopoiesis: ability for self-organization, spontaneous appearance of new structures and behaviours in open systems.

Four basic criteria of systems thinking make it to a paradigmatic change in thinking and understanding of our world (Capra 1998 p. 246, English version 1992):

- From the elements to the whole, that means to the patterns of organisation.
- From single elements to relationships.
- From structures to processes.
- From objectivity to construction of reality by each individual

The four basic dimensions of system thinking according to Ossimitz (2000) are:

- Relational thinking: Thinking in feedback loops and relationships considering indirect effects (including thinking from different perspectives).
- Dynamic thinking: Thinking along the timeline, taking in account time delay.
- Thinking in models: modelling and networks of effects.
- Goal: Acting in a systemic way.

Systems thinking contributes in many ways to help us to understand and act in a sustainable way in a local as well as a global context. Systems thinking is a tool, which links *knowledge* to a larger context and helps us to see it in a dynamic way. As a tool for weighing, making *decisions* and taking *action*, however, it is only useful when it is linked to *values and ethics*. Otherwise it could also be misused in non-sustainable ways.

Systems thinking asks for changing perspectives and the ability to look through other's eyes, that can help to build up empathy and therefore is also linked to the domain of the *emotions*. By means of a systemic view of the world, a feeling of being part of a larger system can evolve.

It expands our world-view and helps to be more aware of the boundaries and assumptions we use to define issues. It integrates decision-making and adaptive management, and encourages consideration of multiple influences and relationships and fosters therefore more participative and interdisciplinary approaches to problem solving. It helps to restore a sense of connection to place, to other humans, to nature and the wider world through realizing the fact that everything is somehow linked to everything else. It also recognises the influences of our *values*, self-perception and interpretations of the world, as well as our intuitional and non-rational ways of knowing. In this regard it also helps us to appreciate others' viewpoints and to discover new properties of whole systems that emerge from the interaction of individual parts.

Today a variety of *methods* is already available for teaching and facilitating these higher-order thinking skills like simulation games, computer simulations, drawing impact-diagrams, mind maps, concept maps etc.

This dynamic way of looking at the world supports us in accepting uncertainty and ambiguity, and in *participating* and learning from change. It is a tool to identify strategies that better generate sustainable solutions for system change, emphasising self-organisation and resilience.

Systems thinking is related to ambiguity and uncertainty – we all have to learn to endure this but at the same time to trust decisions and action even if we cannot see the success or effect right away. Again we find here a link to the *emotions domain*.

Systems thinking asks for a specific way of *action*, which allows self organization and participation and investigates power relationships.

Systems thinking and *constructivism* are closely related to each other. Constructivism is a field of applying systems thinking. For this reason systems thinking can help to plan, organize and reflect learning and teaching activities.

Competentcies for ESD-teachers

We did not find any specific competences on systems thinking formulated explicitly for teachers in the literature. The majority of the competences listed were developed by the group members, some refer to the work of Daniella Tilbury or the Quality criteria of ESD-schools (chapter on culture and complexity). We also referred to the "Habits of a Systems Thinker" of the Project "Systems Thinking in Schools" (see Literature/Media).

a) Teacher as an individual — reflection

- The teacher is able to understand basic models of systems theory (e. g. Vester) and is able to apply them in different situations and for different issues.
- The teacher is able to think in models and patterns, to recognize patterns and relationships in systems, to reflect on them and to consider them in decision making and acting. It all requires well developed imagination-skills.
- He/she is aware that he/she is always part of different systems and realizes, what function he/she has and what role she/he plays in these systems in the society (i.e. understands its structures, culture, practices, and formal and informal rules and expectations and the roles they play within it, including understanding laws and regulations, but also unwritten social norms, moral codes, manners and protocol).
- The teacher is able to resist to the tendency to simplify problems and to look for quick solutions — she/he holds the tension of paradox and controversy and looks at the larger context.

b) Teacher in the educational institution — teaching/communication

- The teacher's pedagogical work in every subject, is based on searching for relationships, multiple influences and interactions such as feedback loops or dynamics over time and finding ways of explaining them or making them visible (ENSI, 2005, Quality Criteria for ESD-schools).
- The teacher is able to encourage the students to look at issues from different perspectives (angles and dimensions) as well as their short- and long-term consequences.
- The teacher is able to guide students to develop empathy by identifying themselves with others. This implies the appreciation of each other's viewpoints which helps to facilitate understanding and the development of solidarity as opposed to a tendency to enhance disagreement.
- The teacher is able to support students in confronting and appreciating diversities – biological, social, cultural – and to look at them as 'opportunities' for broadening options for change and development (ENSI, 2005, Quality Criteria for ESD-schools).
- The teacher is able to foster the student's insight so that, besides exploring issues and interests, they can utilise reason to propose innovative solutions that develop in and through the relationships between them.

- The teacher is able to guide the students to deal with power relations and conflicting interest e.g. in school, in local situations, between countries and between present and future generations.
- The teacher is able to help students to take action by choosing between different options and by reflecting on their own potential (strengths, specialities etc.) as well as short and long term consequences in relation to individual and shared interests, norms and goals. She/he encourages them to monitor the results by presenting different methods.
- The teacher is able to enable students to face ambiguity, uncertainty and complexity – and not to be fazed by it. She/He encourages the students to reflect on themselves and their environment, to look for different solutions, to take decisions to elaborate plans and to realize actions even if the success or effect is not visible right away. He/she helps to build up their faith in a common process in which everyone is an element.
- The teacher helps to restore a sense of connection to place, to others and the wider world (Tilbury & Wortman, 2004).
- The teacher is able to perceive the school as a living system and tries to act with the school team and in class according the insights of systems thinking in the context of ESD (e. g. fostering participation, participatory learning, mutual understanding).

c) Teacher in the Society — networking

- The teacher is able to use wisely existing local, national or international networks for ESD to gain motivation and exchange experiences and perspectives.
- The teacher knows ways to establish partnerships with other schools to generate and exchange ideas and is able to do the same with business, craft, industry, agriculture, community etc. thus enabling a search for synergies.
- The teacher is aware that schools are a part of local, national and global systems.
- The teacher is able to identify and analyse power relationships in society (e. g. community) and to understand their causes/origins (interests, motivations etc.) as well as strategies to cope with them.
- The teacher is aware, that systems thinking is not yet generally understood in society and looks for ways of communicating systems thinking through student works (events, exhibition, presentation, performance, videos, … for parents, the neighbourhood and the wider communities).

Remark:

Competences for ESD which relate to systems thinking by De Haan:

- Competence in foresighted thinking.
- Competence in distanced reflection on individual and cultural models.

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Competenties for ESD-teachers

Waters Foundation: Systems Thinking in Schools (Project).
Available at: www.watersfoundation.org

Competences related to Emotion

Introduction

Emotions for a long time were taboo in science, economy and society (Arnold 2005). Emotional influences on thinking and behaviour were mainly looked upon as a disturbing factor; they were seen as the antithesis of reason. It is only recently that in several scientific areas it has been slowly accepted that affective components are inseparably connected to thinking and that they have important organizing and integrating functions (Ciompi, 1999).

It is therefore not surprising, that in most traditional explanatory concepts for environmental behaviour the influences of emotions have been neglected.

At the end of the 80s emotional aspects were considered important for environmental consciousness in those concepts with a holistic approach. But emotions and feelings were rarely the subject of scientific research or in-depth descriptions in this field. Even models on environmental psychology mostly neglected this aspect (Kals et al. 2000).

From the beginning of the project we selected a set of definitions for emotions and feelings that we found suitable, and then added basic descriptions of emotional competences.

Emotions and feelings

There is not one generally accepted theory of emotions and the terms in various language regions vary.

We suggest using the definition based on the theories of Antonio Damasio (2005): Emotions and feelings are both affective phenomena. The emotion experienced is the beginning of a reaction chain, which ends in a feeling. Emotions are acts or motions mostly visible to others (e. g. in one's face, voice, behaviour) as feelings are only recognizable by the person in whose brain they are evolving.

The term "emotion" is often used as a generic term for emotions, feelings, sentiments.

Emotional competence (emotional intelligence)

The concept of emotional competence assumes that the emotions are a central part of what it is to be human. Generally the following three aspects are included (Arnold 2004):

- Understanding one's own emotions and feelings.
- Understanding the emotions and feelings of others.
- Ability of emotional expression, i.e. the ability to express feelings in an meaningful way.

Salovey and Mayer (in J.H. Otto, 2000) include in their list of emotional intelligence in addition to the list above:

- Regulation of emotions.
- Productive use of emotions (e. g. for planning, thinking, problem solving, motivation).

Empathy

Definition: More than feeling compassion or sympathy "for" another person, empathy puts you in their shoes to feel "with" them or "as one" with them. First used in English in the early twentieth century to translate the German psychoanalytic term "Einfühlung", meaning "to feel as one with", though in practice more closely translating the German Mitgefühl, "to feel with" someone (www.jansen.com.au/Dictionary_DF.html).

Empathy was generally used in connection with other human beings and not with nature. Today this is changing as the environmental movement grows in strength and concepts such as Gaia become more prominent. We, therefore, assume that empathy can also include non-human beings – indeed the whole of nature. Gebhard mentions that concern about nature is often articulated through identification with nature-phenomena (Gebhard 2001, p. 270). De Haan includes empathy as one of the "Gestaltungskompetenzen" for ESD as well. Empathie und Solidarität für Benachteiligte, Arme, Schwache und Unterdrückte zeigen können." (www.transfer-21.de)

Emotional attachment, interconnectedness

Emotional attachment is the precondition, that humans are shocked by changes in their environment. Humans without emotional attachment remain indifferent towards everything that happens around them. E.g. If a human being has not had the chance to develop an emotional attachment to nature he or she will not be able to take on responsibility (cf. Hüther 2005, p. 220).

Therefore one goal of education for sustainable development must be to give students opportunities to develop a deep relationship and feeling of interconnectedness to our world, to life and be supported in this process.

If a person cannot feel awe and wonder, cannot experience delight in the world around them, in literature, music, art and nature itself, then they will live in an inner spiritual and cultural desert. If someone cannot connect to the world around them, then they cannot see the connections in that world and will fail to understand it and the humans and others who inhabit it.

This interconnectedness includes elements of spiritual development, which is rarely described in school curricula. One exception is a document for schools in England and Wales (from which the previous paragraph is taken) which includes the following elements: beliefs (development of personal beliefs in connection with personal identity), a sense of awe, wonder and mystery, experiencing feelings of transcendence, search for meaning and purpose, self-knowledge (thoughts, feelings, emotions …) , relationships (sense of community) creativity (e. g. expressing feelings through arts) feelings and emotions (sense of being moved, hurt …). "This kind of spirituality is open to everyone and is not confined to the development of religious beliefs or conversion to a particular faith."(School Curriculum and Assessment Authority, 1995, p.3/4).

Position within the framework of domains

Thinking, reflecting, valuing, taking decisions and acting are inseparably tied to emotions. Emotions are an essential part of the decision making process (Cornelius, 1996) and also the driving force and primary system for motivation (Arnold 2004, Otto 2000), which has to be taken into account in ESD.

The importance of emotions for environmental behaviour was described by Elisabeth Kals in a model explaining the protective behaviour of the commons. She found different emotional judgements supporting this behaviour: nature related emotional judgements (e. g. deep relationship to nature) are very influential, responsibility related emotional judgements (e. g. feelings of guilt about not enough for the environment, anger about insufficient environmental protection) and positive feelings while acting for the environment (provided that ecological norms are accepted) also have a substantial impact, while the emotional reaction to an awareness of environmental danger has a less positive influence (Kals in Reichle & Schmitt 1998). Armin Lude (in Unterbruner 2005) confirms also the positive impact of varied nature experiences (which always have an emotional component) on positive attitudes to nature and on acting protectively for nature and environment, especially when the experience is reflected upon. Degenhartt (Degenhardt in Bolscho & Michelsen 2002) searched, by in depth interviews with a variety of people

leading a fairly sustainable lifestyle, for necessary competences. He decided that the most important of the eight competences he listed was "Competence of holistic perception": When viewing the world, the combination of different forms of emotional and intuitive perception utilising all the senses combined with a rational analysis, is crucial. The affective and emotional process is, in fact, a necessary condition of perception. Gerald Hüther goes one step further and claims that people without emotional attachment remain indifferent to what is occurring around them, when they are not directly affected. Without activation of emotional centres it is not possible to anchor new experiences in the brain (Hüther in Gebauer & Gebhard 2005). Szagun e.a. (1994) emphasise, that emotions attached to a pessimistic view of the future show even more effect on environmentally sound behaviour than joy about nature. All of these findings demonstrate, that an emotional commitment is needed (Anteilnahme), in order for knowledge to be transferred into action. (Unterbruner in Kaufmann-Hayoz & Künzli 1999, p. 165).

The challenge for education for sustainable development is to carefully include emotional processes as part of teaching and to integrate emotional competences into the process. As Szagun emphasises, dealing with negative feelings as well as empathy and compassion play a key role. In addition, feeling inter-connectedness with the world is a basic condition of any intrinsic motivation for acting in a sustainable way.

Teacher competences related to emotions

Given that the list of competences is daunting, should the following sentence go in as a warning:

'Because of all these issues the task required of teachers is a major one, as the following list of competences demonstrates.'

a) Teacher as an individual — reflection

- Teachers have to be able to use ways and methods to express and manage their emotions and feelings alone and in groups (e. g. conflict management) and use them constructively for improving situations in the school and community (cultural, ecological, social, economic).
- Teachers have to be aware that emotions are crucial to our lives and can often be related to former experiences and also depend on the surrounding culture. Teachers have to be aware of the impact of emotions on perception, judgement, decisions and acting in their own lives and the lives of their students and to take account of this in the way they teach.
- Teachers develop in themselves the competences of compassion and empathy and develop the awareness of interconnectedness with the world/life in space and time.
- Teachers are aware of the emotional dangers of domination (e. g. power relations).

b) Teacher in the educational institution — teaching/communication

- Teachers have motivation and the skills for advocacy both in the school team and for lobbying outside the school for ESD.
- Teachers should be aware of the difference between dealing with emotions within their own class or school organization and with the surrounding society.
- Teachers are able to create a school atmosphere in a way that allows every one to express his/her feelings and to contribute with innovative ideas and proposals without fear of failure. This is a precondition for creativity and visioning.
- Teachers create learning situations and an appropriate atmosphere so that their students are able to develop feelings of empathy and identification with other human beings as well as with nature as a whole in both space and time, and develop a sense of solidarity with all that exists.
- Teachers know how to stimulate ownership and responsibility.
- Teachers help students to develop emotional competence (besides other competences) to consciously make choices and plan actions to achieve positive systemic impact.
- Teachers are able to express their feelings without imposing them on the students.
- Participation-processes, such as exchange activities with students who may be from other parts of the world, have to include emotions as this will facilitate the process.
- When working with emotions teachers should work with real issues connected to the lives of the students.
- Teachers are aware that feelings are strongly developed through real experiences and interaction with other people as well as the environment, and therefore plan for the student's direct access to such experiences.
- Teachers should stimulate positive feelings (well-being) through specific activities (e.g. in relation to nature) but also take seriously their negative feelings when facing the situation in the world (e.g. feeling of despair, powerlessness). The teacher must develop sensitivity towards the student's situation and needs.
- Teachers should promote openness and confidence that generates a process of positive change in them selves and in their students.

c) Teacher in the Society

- Teachers should be good mediators both in resolving conflicts between humans with different interests in the classroom and the school, and in external relations.
- Teachers are able to communicate emotions competently and in a constructive way with parents and other people from within the community, … .

Competences related to Emotion

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Competences related to Action

Action is the process, where all the competences of the other four domains merge to enable participation and networking in SD that result in the creation of meaningful projects. By acting we must be able to apply knowledge, deal with systems thinking, handle emotions and be aware of values. Action, therefore, needs additional special practical skills, abilities and competences in the field of project management and cooperation.

Definition and basic terms

Action in ESD is an individual and social development process based on responsible participation. The action has an educational and a transformative purpose.

Actions as an educational process always include student participation, and the activities are targeted in solving a real existing problem.

A topic suitable for action towards SD should allow learners to:

- experience that SD is full of conflicting interests and changes;
- discuss possible changes;
- find solutions by qualified choices;
- engage in SD and doing action towards SD;
- get experience in self-efficacy in SD;
- reflect upon their actions towards SD;
- gain the capacity for evaluating the action.

Action takes place at different levels:

- Individual;
- classroom;
- school;
- community and local society;
- global.

The following components of student action competence are important (Mogensen, ….)

- Knowledge of action possibilities.

- Belief that they can have influence.
- Desire to act.

Different definitions exist about action or action oriented learning:

a) Learning by doing with didactically arranged questions, or the so-called "as if"-problems. The goal is the learning process itself.

b) Learning by doing through dealing with existing issues and problems. The goals are the learning process and the experience students have of meaningful action and self-efficacy.

In the CSCT-project the focus is on the second definition.

Examples of this kind of action oriented learning of students are illustrated in the "Quality criteria for ESD schools" (ENSI, 2005), for example:

- "ESD calls for practical actions and decision-making - schools cannot only speak about the future but must act for the future. Te main aim is to understand how things work in reality in order to be prepared to change them in the future, if required. The outcome can be more or less successful without leaving the students with a feeling of frustration. But when an outcome is reached, and a little dream of change becomes reality because of the joint efforts of the class or the school, it is extraordinarily important to value this change, also for the students who have not participated, and to nurture and maintain the results obtained."
- "However, besides this more "rational" kind of knowledge there is also meta-knowledge that the students acquire by having been personally involved in solving a real-world problem."

In the same document the important role of participation is pointed out:

- "Moreover, student participation is central because the teaching and learning process deals with and affects their lives and their futures. However, participation does not mean that the students should decide everything about the project. The important point is to create room for the students' opportunity to choose to participate at the highest level of his or her ability but with the teacher as the person being responsible for the overall quality of learning that takes place in the allocated time."

In the German BLK21 programme the role of action, participation and self-motivation is emphasized.

One criterion for choosing topics is the possibility for action. By participation they differ between:

- participation in schools: with students, parents, in the team of teachers;

- participation of schools: with partners outside in community, private firms, others schools.

Interesting in the context of action competence is a new idea of Hartmut von Hentig (2006). He presents a new type of school for 13-15 year old students. During puberty they should work outside in the communities for example for environmental, social or other goals. In this process, they learn by doing something meaningful for the community.

Competences

Teacher as an individual – reflection and visioning

The teacher as a person should;

- be able to imagine alternative futures and new, creative solutions;
- be aware that SD in the present world calls for change;
- be able to act as an "agent for changing";
- have knowledge about the practice and principles of SD;
- know that SD calls for critical thinking and reflection;
- know that SD calls for individual and social responsibility;
- be able to reflect critically on one's lifestyle and choices;
- be able to explain his own position and have civic courage;
- be able to work in a project and problem orientated way;
- be able to deal with uncertainty;
- be persistent and be deal with counter arguments;
- be able to network in order to establish teams and partnerships;
- be able to share the responsibility for the teaching process with the learners;
- be able to think in systems.

Teacher in the educational institution – teaching/communication

Teachers should be able to:

- Regard action as an educational value, not only as a way to solve problems.
- Find the possibilities/opportunities for learning processes in the real world especially these topics which fit for action towards SD.
- Define relevant (learners, societies and curriculum) topics for action towards SD and break it down into steps for action; describe conditions in society that can be the reason for action.
- Organize and facilitate local and global action as an individual, in small groups or in communities.

- Organize and accompany learning as a participation process.
- Organize settings which allow learners to:
  - ο experience different perspectives of SD;
  - ο find different solutions for topics of SD;
  - ο identify the direct and indirect consequences and effects of their decisions and actions.
- Organize settings which facilitate the ability of students to experience success and self-efficacy.
- Organize and facilitate learners comprehensive reflection on different action possibilities and on the action process (meta knowledge – meta reflection).
- Organize and facilitate vision processes among learners as the basis for action towards sustainability (imagine a better/another future).
- Promote critical thinking.

Teacher in the society – networking

Teachers should be able to:

- Analyse and describe the local society through SD (Agenda 21 models) models (natural, social and economical).
- Analyse the power relations in local (and global) communities.
- Deal with political situations, think and act strategically.
- Facilitate networking in order to find the relevant knowledge for ESD and to establish partnerships.

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Action Research as Interventional Research in ESD

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By way of introduction, this paper presents some brief working definitions for education for sustainable development, followed by an outline of the concept of "intervention research" as action research. Action research is a strategy to combine processes of development and research.

Education and learning for and through sustainable development

In an attempt to structure sustainable development, it will be broken down into ecological, economic, social, and politico-institutional sustainability. A sustainable society is developed within the framework of a social process of inquiry, learning and shaping. It is essential to organise this process in such a way as to ensure that different ideas and interests are involved in a participatory way. Contradictions, dilemmas, conflicting targets and interests must be renegotiated in a discursive process between all those concerned and for every specific situation. The consensus arrived at is not static in nature, but has to be renegotiated at different times with the involvement of persons and groups concerned. These processes of negotiation and participation will enable a learning process for all persons and institutions involved.

Education for sustainable development is part of the general educational remit to enable every new generation to humanise living conditions. This is based on a definition of education which emphasises the self-driven development and self-determination of human beings in a discourse with the world, other people and themselves. In this context, education for sustainable development refers to the human capability of taking part in the shaping of society in an informed, reflective, and responsible manner, with a view to sustainable future development.

Questions as to how the future may be designed with a view to sustainable development at the local, regional, and global levels, are systematically addressed in concrete activity areas. This means learning on the basis of real-life situations through exact observation, critical analysis, evaluation and taking an influence with the objective of developing "shaping skills" (*Gestaltungskompetenz*) on the basis of information and reflection (cf. de Haan/Harenberg 1999).

It is particularly relevant for the school context that this will, among other things, promote meaningful learning, which - as empirical studies (cf the TIMMS and PISA studies) corroborate - many students currently do not develop. This is an interactive process that promotes both socially sustainable development in a local, regional and global context as well as "higher order learning skills".

A partnership between research and education

Analyses in the area of sociology of science show that societal practice is becoming increasingly reflective itself. Science and practice are increasingly related to each other, and science is increasingly oriented on practical objectives. This has become necessary as the heightened complexity of social practice can hardly be coped with when research and development remain separate. This also leads to significant developments in the education field: the traditional separation of phases of knowledge acquisition and knowledge application are replaced by the principle of "lifelong learning" (cf. Weingart 1976; Bammé 2002; Posch 2002).

Co-operation between research and education is encouraged further by the oncoming UN decade on "Education for Sustainable Development" (2005 – 2015) and, in the European Union, by EU documents supporting this concept and, consequently, development and research projects funded by the European Union.

Intervention research

A scientific approach which generates its knowledge "on site" in co-operation with the individuals concerned may be designated as "intervention science", the concomitant research process as "intervention research" (cf. Bammé 2002, Heintel 2002, Krainer 2002, Rauch 2002):

- Intervention research is directly linked to social issues (in this case sustainable development). The point is to not merely apply knowledge previously acquired in practice, but to generate new knowledge on the spot, i.e. in co-operation with others. This type of knowledge could not be significantly generated within the relatively confined institutional boundaries of a university.
- Hence, intervention research is basically process-oriented, and the knowledge generated context-related. Scientific "truths" are not brought in from the outside and "applied", but generated in continuous interaction and communication with practitioners.
- Intervention research is an attempt to eliminate the institutionalised division of labour between investigators and practitioners that promotes a separation leading to growing mutual dissociation. In this context, the division of science into individual

and specialised disciplines represents just as much of a barrier as a classical, mechanic definition of science.

- Intervention research combines a development focus, i.e. the wish for change and improvement, and a knowledge focus, i.e. the wish to generate knowledge and understanding. It leads to a negotiation of interests and procedures. "Specificising" (Germ. "Verbesonderung"; situation-driven insights and development) takes priority over "generalisation".
- Intervention research is marked by the fact that some of its developments and insights that have provisional character are directly fed into the research process in small portions via reflection loops. Hence, it has a marked formative dimension.

With reference to existing literature, three types of intervention research (IR) may be distinguished: participative IR, co-operative IR and collaborative IR (cf. Krainer 2002):

Intervention research (IR)	participative IR	co-operative IR	collaborative IR
Research objectives and methodology	Conceived by I, P are aware of it (but are not integrated)	Conceived by I, where necessary modified in agreement with P	Conceived in collaboration by I and P
Data acquisition	Under the responsibility of I; P provides data (but does not acquire them)	Under the responsibility of I; P provides data (self-acquired where necessary)	Jointly or as divided between I and P
Evaluation	Under the responsibility of I, P is informed (but not involved)	Under the responsibility of I, P is involved by a feedback loop	Jointly or as divided between I and P
Publication	By I; P is informed (but not involved)	By I (with reference to P), partly by P	Jointly or as divided between I and P

I = investigators, facilitators

P = practitioners

In the following, two aspects of co-operative intervention research of special significance for bridging the gap between research and practitioners will be described in more detail:

1. The link between the development focus, i.e. an interest in change and improvement, and the knowledge focus, i.e. an interest in generating knowledge and understanding, is an important aspect. Understanding and change are two basic principles to which intervention research is committed. Basically, evaluation and research approaches can be classified by the correlation between these two interests. Given a linear scale, the two extreme ends of the scale could be designated as basic research and action-oriented learning, respectively. It should be added that basic research -- albeit not deliberately -- always implies development elements, just as action-oriented learning always implies new insights and/or stimulates others to develop theories. Between these two poles, the correlation between the two basic principles shifts on a sliding scale. Action research for instance, lies near the development pole, but usually includes more research elements than action-oriented learning. To the extent that investigators input issues that drive research, the knowledge focus will grow in importance and the attention shift from evaluation towards research. The final composition of specific evaluation and research elements depends on the respective context in which the intervention is to occur. Generally it may be said: the individual type of intervention research depends on whether the focus lies on intervention (change and development) or research (knowledge and understanding). At any rate, the greater focus on the research component and the relative autonomy of the researchers is a genuine contribution by the science world. It is probably going to be even more important in the future, since it corresponds to the trend in our society to rely increasingly on science and reflection (cf. Bammé, 2002).

The German variant of action research (cf. i.a. Moser, 1975) may be seen as an example of "co-operative intervention research". The difference in our understanding of action research lies in the fact that -- in reference to the criteria described by Bammé (2002, p 17) – the German variant considers the "subjectivisation" of the "researched" (and thus the elimination of the "subject-object separation" between the researcher and those that the research is directed at) as something desirable to be encouraged, while action research considers it as a given, a constituent element (cf. Altrichter & Gstettner, 1993; Altrichter & Posch 1998; Posch, 2003). This corresponds with the new phase of development in educational research for schools and subject didactics (cf. Krainer & Posch, 2000) which is marked by reflective rationality, and in which practitioners are increasingly seen as contributors in their own right with a view to education research and subject didactics. A development occurring largely parallel to the 4th phase is a rapprochement between research and politics which is also reflected in the growing significance of "policy-oriented research". It must be stressed that action research is in no way restricted to practitioners systematically reflecting on their own practice, but may also refer to reflections of practitioner teams on their practice of mutual support, i.e. to self-evaluation-based research on the impact of innovations carried out.

2. Another important aspect concerns the manner in which co-operative intervention research manages the interfaces between 'research investigators' and 'investigating practitioners'. On the part of practitioners, this co-operation presupposes an active interest in research and a certain scientific attitude, linked with the assumption that insights are a precondition for high-quality development. Before changing anything, it is advisable to understand what the current situation is, what the objectives are and what changes are (therefore) aspired to. The central point is how classical research and action research correlate and whether there is something like a common roof, a common basic attitude. In this context, Richard P. Feynman (1987), Nobel Prize laureate in physics, offered an important pointer. Reflecting on the characteristics of science and research Feynman emphasised that it was important "not to fool oneself or others". This is a plea for a systematic and self-critical reflection on one's own research actions. There are many pitfalls, one of them residing in the fact that one will get confirmation for the results that one expected to get or even hoped for. In spite of sophisticated tools, researchers in the classical sense of the word are just as susceptible to corroborating their theoretical hypotheses through circular reasoning as action-research practitioners whose evaluation of their classroom work aims at having students tell them what good teachers they are.

3. A third aspect of intervention research is to provide balanced answers to the following four basic questions about the generation and effectiveness of knowledge:

- WHAT type of knowledge is generated: context-oriented, relating to a specific situation or general, generalised?
- WHO owns the knowledge: self-determination or determination from outside for those concerned?
- WHEN will the knowledge be available: immediately and in an emerging process or at the end, as a final report?
- HOW is the knowledge generated: in an interdisciplinary, functional, open manner or in a manner specific to a subject, causally, closed off?

On the first basic question: there is context-oriented knowledge which relates to the specific characteristics of a given situation. If practitioners, for instance, want their students to be more pro-active in environmental studies, they will predominantly be interested in the type of knowledge that helps solve this problem. Since every classroom and every teacher is different, it is difficult to make a generally valid statement in this context. Therefore, practitioners will hesitate to access general, generalised insights, even if they have an important place in science. The problem of generalisation presents itself in a different light when it comes to co-operative intervention research. In this case, generalisation does not mean that one insight will apply to everyone in the same way. Rather, it refers to the fact that insights which concern only a specific issue in the classroom work of one teacher may lead to a generalised insight relating to all classroom activities of that particular teacher. The teacher might, for instance, have recognised a certain pattern which is generally applicable to him or her. Hence, that teacher has made a kind of "specificised generalisation". If the teacher passes on this insight to other

teachers they may in turn recognise a similar pattern in certain situations in their own teaching practice. Learning a new method (detecting patterns in one's own teaching practice for instance) may also be a starting point for using these elements of reflection in other situations. These are examples of alternative types of "specificised generalisation". We have two expand our classical understanding of generalisation and become aware of its connections with "specificising" (*Verbesonderung*, cf Heintel, 1988).

The "naturalistic" approach is another way of coping with the problem of generalisation in context-oriented knowledge (case studies for instance). In contrast to the classic theory of generalisation, other conceptions have emerged that emphasise the cognitive content and process of generalisation. The idea of naturalistic generalisation (Guba & Lincoln 1982; Stake 1995) implies that it is the researcher's responsibility to provide sufficient contextual information and a thick description to enable the reader to make judgements about whether or not any particular case can reasonably be generalised to their own specific field of practice (Robinson & Norris 2001).

On the second basic question: is the knowledge concerned a type of knowledge that remains within the confines of practice and offers little opportunity to gain scientific insights? Or does it concern a type of knowledge that is generated in the area of research and will at most be retransferred to practice (linked to the postulation that there is a direct transfer of knowledge)? Intervention research presupposes a negotiation of interests that specifies what type of knowledge is generated by whom and in what form and where it is made available.

On the third basic question: in classical research a research report is submitted at the end of the project. Only then will anyone be able to draw "conclusions" from the results. By contrast, developments and insights can have an immediate impact in intervention research as they emerge continually and gradually and have a provisional character. This being said, a final report does have an important function relating most of all to summative evaluation, related insights and meta-reflection.

On the fourth basic question: in particular areas knowledge can be predominantly generated in interdisciplinary, functional, and open processes, but one also needs a basis which is gained in subject-specific, causal and closed systems of thought (in mathematics for instance). Both types of knowledge generation have their validity, the point is to achieve a balance that is appropriate for the respective context. The way science is organised clearly gives priority to mono-disciplinary approaches. As social practice is increasingly looking for answers to complex problems, there is a need to enhance interdisciplinary, functional, and open approaches. Although basic research will always be important, the question of the impact of (academic) knowledge (cf. i.a. Grossmann, 1997) seems to become a more central issue. Intervention research offers an interesting perspective because it not only combines developments and science, but also uses co-operation to build bridges between the systems of "science" and "education" (or other fields of practice). The practical impact of knowledge is thus part of its mission. The book

Taking steps towards the knowledge society (Nyhan, 2002) points in that direction by arguing that in a "knowledge society" multi-dimensional and collaborative models of knowledge development will replace top-down academic approaches.

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Case Studies: Introduction

The following chapter of the report contains the case studies of the participants of the CSCT project. The twelve case studies are listed in alphabetical order of the countries involved:

Austria

Study 1: "Fueps – Interdisciplinary Project Studies". An Example for a Competency Based Module in the Curriculum for Teacher Education in Austria

Authors: Friedrich Palencsar & Kornelia Tischler

Institution: Alpen-Adria-University of Klagenfurt, (Institute of Geography and Regional Studies & Institute of Education)

Study 2: University Course "Education for Sustainable Development – Innovations in Teacher Education" (BINE)

Authors: Franz Rauch, Regina Steiner & Franz Radits

Institution: Alpen-Adria-University Klagenfurt, (Institute of Instructional and School Development) & FORUM Environmental Education (University of Salzburg)

Belgium

Study 3: Case Study of Belgium at the KHLeuven Teacher Training Department

Authors: Veerle De Smet, Veerle Gaeremynck & Ruth Wouters

Institution: KHLeuven

Denmark

Study 4: Case Study on ESD at University College CVU-Vest, Denmark Teacher Education at Ribe Seminarium

Authors: Briand Baeklund & Birgitte Sperber

Institution: College CVU-Vest

From Denmark the concept of a second study named "Implementing of ESD at CVU Vest 2006" by Soren Vinding was submitted and discussed but not finished as the Author dropped out of the programme due to retirement.

Germany

Study 5: Title: Study Programme Sustainability – a Way to Impart Competences for Handling Sustainability?

Authors: Matthias Barth, Jasmin Godemann & Anne Busch

Institution: University of Lueneburg

Hungary

Study 6: Revision of the "Environment and Society" In-Service Teacher Training Course in Hungary

Author: Eva Csobod

Institution: Regional Environmental Centre for Central and Eastern Europe

Norway

Study 7: Case Study: "Industry in Telemark", Course for Teacher Students in Practical Pedagogical Euducation

Author: Marina Aase

Institution: Telemark University College

Spain

Study 8: Education for Sustainability in Initial Primary School Teacher Education: A Proposal of Innovation

Author: Mercé Junyent

Institution: University of Girona

Study 9: Dialogue Discipline Experience between Dance and Science to Tackle Waste Management

Authors: Genina Calafell, Josep Bonil, Maria Rosa Pujol & Mariona Espinet

Institution: Universidad Autonoma de Barcelona, Grupo COMPLEX

Switzerland

Study 10: North – South Relationship: Past – Present – What Future? A Teacher Training Module

Author: Barbara Gugerli-Dolder

Institution: Pädagogische Hochschule Zürich

Study 11: Case Study FHNW Solothurn

Author: Esther Bäumler

Institution: Pädagogische Hochschule Nordwestschweiz

Wales

Study 12: Education for Sustainable Development and Global Citizenship in Wales

Author: David Nordcliffe

Institution: University of Wales, Newport

Documentation guidelines for case studies

The CSCT group developed guidelines for the studies at the meetings in Fano (Denmark) and Szentendre (Hungary).

The cases can be different initiatives in pre-service and in-service teacher training but should have at least 2 to 4 ECTS and may cover

- already existing/running initiatives or;
- planning and trial of implementation of initiatives.

The length of each case study should be approx. 10 pages (excl. materials)

Steps	Examples
1. What is the relevant context?	Starting point, institutional context, wider context such as law, position in the curriculum

2. What are the intentions of the initiative related to competences?	What competence areas will be covered?
3. What have we done?	Related to content, teaching methods, methods of student assessment, programme evaluation (if existing), planning, processes to implement the curriculum in the TT institution)
4. How did we research the initiative? (Action Research)	Research questions/focus of evaluation, methods to gather data (i.e. research diary, student observation, interviews, questionnaires), methods to analyse the data
5. Description of empirical data	Notes from research diary, interviewdata and data from questionnaires and observations
6. Analysis of empirical data	Connection and contradictions etc. in relation to the research question/focus of evaluation. Have we reached our goals? What side effects have occured?
7. What did we get/learn for future planning?	Outlook / planning for the future
8. Material used (instruments, teaching strategies, tools)	

At the meetings in Barcelona (Spain) and Klagenfurt (Austria) draft versions of the studies were discussed in workshops. Additionally, Peter Posch, Klagenfurt University, an internationally well known scientist in EE and Action Research, gave feedback on the drafts of the studies.

Connections between the dynamic CSCT Competence Model and the Case Studies

The CSCT Competence Model for ESD in Teacher Education and the case studies were developed jointly in the course of the meetings of the project from 2005 to 2007. Although all studies generally deal with ESD as a whole, some of the competence areas were evaluated more precisely. The dark grey fields in the table below show these competence areas in the different studies.

Case-Study	Action	Knowled-ge	Systems-thinking	Emotions	Values Ethics
Austria, Study 1 (Palencsar/Tischler)	███	███			
Austria, Study 2 (Rauch/Steiner/ Radits)	███	███	███		
Belgium, Study 3 (DeSmet/Gaeremynck /Wouters)		███			███
Denmark, Study 4 (Baeklund/Sperber)		███	███		███
Germany, Study 5 (Barth/Godemann/ Busch)		███	███		

Hungary, Study 6 (Csobod)	■	□	■	□	□
Norway, Study 7 (Aase)	■	□	■	□	□
Spain, Study 8 (Junyent)	■	■	■	□	□
Spain, Study 9 (Calafell/Bonil/Pujol)	□	■	■	■	□
Switzerland, Study 10 (Gugerli-Dolder)	■	■	□	□	■
Switzerland, Study 11 (Baeumler)	□	□	■	□	□
Wales, Study 12 (Nordcliffe)	□	■	□	□	□

Table: Distribution of competence areas in the different case-studies.

The distribution of the areas evaluated throughout all studies indicate that emotional and value aspects are hard to research at least within the limited ressources of the projects. Nevertheless, these aspects should gain more importance in future curriculums, learning concepts and research activities.