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Education for Sustainability

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DEFINITIONS AND GUIDING PRINCIPLES OF EDUCATION FOR SUSTAINABILITY

There is no doubt that the pollution and destruction of the natural environment is one of the key sociopolitical problems of an increasingly industrialized world. Despite numerous attempts to reduce the threats of ecological damages, most of the global ecological problems and their long-term effects are not yet under control (for example, global warming, deforestation, extinction of species, destruction of the ozone layer, exhaustion and pollution of natural resources; e.g., McKenzie-Mohr, 2002). For a long period of time, these problems have been considered primarily as technological challenges that can be managed by new, more energy-efficient technologies. However, to a large extent, ecological problems are due to maladapted human behavior. This is particularly evident with regard to the continuous growth of the human population on earth. Consequently, within social sciences, the ecological crisis has been called a “crisis of maladapted behavior” (Maloney & Ward, 1973) or a “crisis of culture” (Devall, 1982). As social scientists, we need to study the complexities of these maladapted behavior patterns and their moral implications not only in terms of the costs to human health and welfare, but also of the ethical aspects of our relationship as humans to the general welfare of the planet (see Kahn, 1999).

Efforts in “education for sustainability” attempt to partially address these environmental and moral concerns. Education for sustainability includes teaching and other intervention strategies to promote values, knowledge, skills, and motivation to help achieve ecological, economic, and social welfare (Jones, Selby, & Sterling, 2010). This is in line with the definition of “environmental education” as the “curriculum encouraging understanding and appreciation of the environment through subjects such as local history, ecology, pollution etc.” (Page, Thomas, & Marshall, 1980, p. 122).

The focus of this chapter is how environmental psychological research can inform education for sustainability. First, we describe the historical paradigm shift from the
one-dimensional term “environmental protection” to the multidimensionality of “sustainability.” Then we offer an overview of approaches for promoting sustainable behavior, reflecting the broad variety of target groups, aims, and frameworks of these intervention programs. Many successful intervention programs show that children can be introduced to sustainable behavior from an early age but these efforts must still be much more reinforced and established than is currently the case. We focus on the moral dimension of sustainable behavior by taking the socio-ecological dilemma into account, and we present a wide range of empirical findings on the moral dimension of ecological thinking, feeling, and behavior. We reflect the difficult question to what extent these findings are taken into account by intervention programs. Finally, we propose concrete suggestions for evidenced-based approaches to promoting sustainable thinking, feeling, and behavior.

FROM ENVIRONMENTAL PROTECTION TO SUSTAINABILITY

“Sustainability” and its synonymous term “sustainable development” were originally used in forestry and forest management. From the report of the Club of Rome (Meadows, Meadows, & Behrens, 1972), through the Brundtland Report (WCED, 1990) and the world summit for sustainable development in Rio de Janeiro in 1992, it has gained the status of a guiding principle in the discussion on ecological problems and necessary behavioral changes and is one of the most popular terms within the public discourse on ecological problems. Sustainability is discussed on all political levels and has now displaced the older principles of “pollution control” and “environmental protection” (De Haan & Kuckartz, 1998). In its original meaning, sustainability represented the normative demand to realize intergenerational justice so that the next generations could enjoy adequate opportunities for economic and social development (WCED, 1990). However, the global spread of the term has led to an increasingly inconsistent use and a multitude of definitions (see Kaufmann-Hayoz, 2006).

Consensus exists that sustainable development goes beyond environmental protection with its primary focus on pro-environmental aims and efforts. Instead, various socially accepted aims need to be balanced. In the relevant literature, ecological, economic, and social targets are discussed as three different dimensions of sustainability (see Jüdes, 1997; Kreibich, 1996):

- The ecological dimension, also called ecological sustainability, encompasses aims with regard to the natural environment, such as the protection of natural resources, the reduction of environmental pollution and contamination, climate protection, the protection of the ecosystems, the care for nature and landscape areas, the conservation of biodiversity, and so on. This part of sustainability is largely congruent with the older term of environmental protection.
- Sustainable economic development includes such things as economic welfare, protection of job security, economic freedom, and freedom of choice.
- The third dimension comprises sustainable social development, including, among other factors, the satisfaction of basic human needs so that future conflicts over the distribution of resources can be avoided. This explicitly embraces the need of intergenerational justice.

Although these fields define the most commonly cited dimensions of sustainability, the list is not exhaustive (see Valentin & Spangenberg, 2000).
The various dimensions of sustainability (ecological, economic, social), although closely interconnected, often compete with one another and cannot be easily reconciled. There is a complex transdisciplinary discussion on the right balance between the dimensions to achieve justice (see Kreibich, 1996): Should the ecological dimension be given priority? Or should all three dimensions be weighted equally? To what extent can economic welfare be achieved without putting ecological aims at risk? In the literature, only a few examples are reported where a balance between the three dimensions was explicitly sought. One of these examples includes an ecological village with about 30 households, where sustainable lifestyles were established bringing together ecological, social, and economic aims (Kirby, 2003).

Summing up, sustainability is a “fuzzy set” (Linneweber, 1998, p. 66) that leaves room for interpretation. Sustainable development is always the product of weighing competing aims and values against another. A justice perspective can offer a theoretical framework to this discourse by constructing ecological conflicts as conflicts of justice (Montada, 2007; Müller, 2012) that also concern the justice for future generations (Gethmann, 2008). Therefore, the concept of sustainability does not imply that there are “easy” technological solutions to the interlocking social, ecological, and economic problems. Rather, it shows that the greatest challenge of modern societies is to develop cultures of discourse, to find ways to consider the many issues involved, to respect the interests of stakeholders as well as the rights of nature. Individual competencies for conflict resolution, awareness of moral dilemmas, and a democratic culture of mutual understanding lie at the heart of an education for sustainability.

OVERVIEW OF APPROACHES FOR PROMOTING SUSTAINABLE BEHAVIOR

Globally, many efforts are underway to promote pro-environmental or sustainable behavior. Many non-governmental organizations (NGOs) point at education as a key instrument for promoting sustainable development (see Huckle & Sterling, 1996). Before going into detail, we will give an overview of the different scopes and dimensions of programs for promoting sustainability.

In terms of focus, education programs can follow two different approaches (see Kyburz-Graber, Hofer, & Wolfensberger, 2006): The first approach encompasses intervention programs that are aimed at the promotion of pro-environmental behaviors. These programs usually combine learning about nature and the environment with outdoor experiences. In contrast, the second approach explicitly refers to moral dilemmas and conflicts that arise when complexity of the issue is taken into account. In these programs, the human-environment relationship is a central theme, for example by studying the use and misuse of natural resources.

They can also vary on targeted audience (e.g., governments and intergovernmental bodies, non-governmental organizations, the mass media, and the private sector, see Leal Filho & Littledyke, 2004). An example for a broader approach would be community-based programs that aim at advancing concerns for sustainability in a municipality (e.g., educational programs in adult education centers).

Sustainable development in the context of businesses is also discussed as “greening of business” (see Huckle & Sterling, 1996)—a concept with increasing application, which is also due to stricter environmental laws and the fact that “sustainability” has become a
key criterion for organizational evaluation. As such, it is applied as a criterion of “good work” in organizations, as a valuation standard of corporate culture, or as one of the dimensions of corporate citizenship (Habisch, Jonker, Wegner, & Schmidpeter, 2005).

Besides their context, other criteria for categorizing programs are defined by the following questions (for an overview, see Ahlberg & Leal Filho, 1998):

- Does the program focus on individuals, trying to modify their attitudes, values, emotions, or behaviors, or on the situational context, by changing the basic dilemma structure through incentive systems, such as lowered prices for mass transit systems or stricter laws to protect the environment?
- What is the target group? Is it individuals, who should rethink and change their individual behavior (e.g., decisions in their households, their consumer behavior, or political votes); multipliers, like people with high social standing, influence, and acceptance (teachers, leaders in organizations, etc.), or even mega-actors, who are especially influential by their decision-making, either in the political or the economic system?
- What specific aims, strategies, and means are implemented in the program, and on what theoretical base are they founded?
- On what level does the program take place (e.g., on the level of individuals or organizations)?
- Is the motivation to conduct the program mainly internal or external, and how and by whom is the program financed and evaluated?
- Is the program based on practical (social) or academic problem definitions and objectives (Scott, 2006)?

Many sustainability education programs are unpublished and, therefore, not part of the body of scientific knowledge. One reason might be that there are no research interests involved and that the programs do not meet any of the previously mentioned scientific standards. Concerning programs that are guided by standards of program implementation and evaluation, an important area is in post-secondary education, in particular university education. Sustainability is included in Bachelors and Masters programs in a broad variety of disciplines, such as education, environmental psychology and other environmental sciences, geography, economics, business, law, engineering, media and cultural studies, nursing and health sciences, art and design, languages, theology, etc. (for an overview, see Jones et al., 2010). The implementation of issues of sustainability in programs is discussed in almost all disciplines, and even in business-related degree programs (MacVaugh & Norton, 2012). A variety of different political, methodological, and didactical approaches is, for example, covered on the level of the UNESCO program “Higher Education for Sustainable Development” (for an overview, see Adomßent, Godemann, Leicht, & Busch, 2006). Academic teaching of sustainability at higher educational levels often goes together with processes of “greening the campus” (see Jones et al., 2010). In these processes, teams of college students, educational and technical staff work together to identify areas where the environmental balance of the campus can be improved, for example by developing monitoring systems for energy and water consumption, by using solar energy, or by using knowledge from psychology to change energy-using behavior at the university. Often, these projects are audited and become part of larger programs that also involve local and regional stakeholders, like transportation companies, utility companies, and many more.
In many countries, education for sustainability has become an institutional requirement on the level of primary and secondary schools (see Simonneaux & Simonneaux, 2012). Overviews for programs on this level have been published previously (see, for example, Krizek, Newport, White, & Townsend, 2012; Leal Filho, 2011) along with helpful materials for practitioners, scholars, and researchers in this field (see, for example, Satapathy, 2007). Ahlberg and Leal Filho (1998) have compiled examples from national experts for curricular school achievements from all over the world, such as the curricular endeavor to educate pupils aged 4–14 in sustainability in Scotland, teacher training in Mexico, environmental education centers in a National Park in South Africa, a Flemish green school project, environmental education on soil features in Slovenia as well as in the region of Poland, the Czech Republic, and Germany. Many more current examples of school programs aiming at promoting sustainable thinking and behavior are reported by Clarke (2012), such as Sweden’s “Forest Schools,” China’s “Green Schools” program, the US “Green Ribbon Schools,” or the “School of Sustainability.” As Clarke explains, schools of sustainability should not follow the traditional path of education, asking “what kind of young adults do we want to see as a result of this process?” but rather ask “what kind of sustainable community do we want our schools to build as they redefine their service to others?” (Clarke, 2012, p. 107). As an example, he reports a project where the concept of urban farms is located in a school environment. Teachers, students, parents, and the local community work together to explore the space around the school buildings, come up with new ideas of how to use the space, create work groups to collaborate on many different projects (like the production of food, the redesign of a space as a small stage, etc.), make plans on the management of the spaces, etc. It is evident that this process should not be seen as yet another burden for school teachers who have to follow a strict learning curriculum, but as a resource and a place where learning can take place.

An overview of the international perspective in environmental education is also presented by means of collected examples (see Leal Filho & Littledyke, 2004). The number of specific examples for schools and other projects to promote sustainability by education is enormous. However, it seems to be an ongoing, dynamic process with networking or exchange between the various approaches being very difficult. Most texts, consequently, close with demands for further interventions on the level of curricula.

Although education for sustainable development needs to be established as a political aim on a societal level, schools are, without any doubt, the primary institutions for formal education. As schools contribute to the moral development of children (see Davidson, Khmelkov, Baker, & Lickona, 2011) they have the responsibility to promote sustainable behavior as well (for a further discussion of the role of primary and secondary schools, see Lange, 2012).

In the literature, several key concepts are defined that are the basis for acting and deciding in a sustainable way. The key competences, systematic thinking, anticipatory thinking, and critical thinking were empirically investigated (Rieckmann, 2012). If the moral dimension of sustainability is to be included, Kohlberg’s moral stages (Kohlberg, 1984) need to be discussed besides cognitive abilities. The level of critical reflection rises by age and experience, and establishing education for sustainability on higher curriculum levels would allow more sophisticated intervention aims and the outlook that graduates, for example, could function as multipliers after their studies. Nevertheless, despite the definite statements of the original theories, in modern psychological and philosophical views knowledge seeking is integral at every phase of the process (see Kuhn, 2010).
so that there is no necessary need for post-conventional moral reasoning to start with corresponding interventions programs. In line with this modern view there are many attempts which have successfully begun to establish sustainable development at an early age (see, for example, McNichol, Davis, & O’Brien, 2011; Zoller, 2011). As a conclusion of the theoretical and empirical findings, children can be introduced to principles of sustainability from an early age, but these principles need to be regularly reinforced and refined (see Huckle & Sterling, 1996).

THE MORAL DIMENSION OF SUSTAINABLE THINKING AND BEHAVIOR

The moral dimension of sustainable behavior is approached by various disciplines, such as moral sociology (with a focus on collective actors), moral philosophy (focusing on normative questions), moral education (aiming to change behavior), and moral psychology (mainly trying to explain behavior empirically, based upon individuals’ perspectives). This section follows this last approach. Within this approach, Schnack (1998, p. 83) responds to the question “Why focus on conflicting interests in environmental education?” with a simple answer: “Because environmental problems are constructed of conflicting human interests in relation to nature.” More specifically, environmental issues can create a dilemma or conflict in which people must choose between short-term individual and long-term societal interests as well as interests in relation to nature. Typical for these kinds of dilemmas is that environmentally unfriendly behavior yields individual benefits in the short run: Far-distance travels for holidays, for example, are attractive and beneficial for an individual. However, the same behavior can contribute to environmental pollution in the long run, which causes harms to the society and the individual. On the other hand, environmentally friendly behavior is often considered as less attractive—for example, many people prefer using their car to using public transportation—but has, as is evident, positive long-term effects on society, the individual, and the environment. The very structure of these dilemmas can be found in many areas of environmental conflicts, be it on a local (for example, the question whether to build a beltway in a nature protection area) or a more complex global level (for example, behavior connected with the emission of greenhouse gases).

Behavioral changes are doubtlessly necessary to overcome the ecological crisis and thus sustainable action serves the community as a whole. The necessary decision-making includes behavior at a private as well as at political and economic levels in such a way that mega-actors in politics and industry take the ecological consequences of their decisions into account just as well as the economic and social consequences. A shift in cost–benefit outcomes of the decisions, however, facilitates a self-serving bias (Linneweber, 1998). This is described by the paradigm of the socio-ecological dilemma (also called “social trap” or “commons dilemma”; Hardin, 1968; Platt, 1973) and can be illustrated by individual private decisions, but is also applicable to the decisional structure of mega-actors: Environmental damages are side effects of productive, useful, or enjoyable activities serving various interests and values of people. Pro-environmental politics and behaviors imply restrictions on these interests and values. The various costs, however, like reduced comfort, the effort required to change behavior patterns, or financial shortages, are individualized: They directly and exclusively affect the acting individual, whereas society as a whole benefits from sustainable behavior.
On the other hand, environment-endangering decisions may have direct and personal benefits for the individual. Ecological risks and burdens that derive from these decisions are perceived to be external to the individual. Due to this externalization, environmentally risky decisions become a “rational choice” in cases in which an alternative environmentally relevant behavior could be chosen as well (Montada & Kals, 2000). This is not to say that every activity with negative ecological side effects is necessarily irresponsible or selfish. Rather, measures to protect the environment may interfere with other highly valued social objectives, such as freedom of choice. This is also reflected in the shift from the term “environmental protection” to the term of “sustainability” (see Schmuck & Schultz, 2002).

Further conditions may promote decisions that put the environment at risk. For instance, the causal chain from CO₂ emissions due to the use of fossil energy resources to the greenhouse effect is indirect, uncertain, complex, and delayed to an indeterminate point of time in the future (see Schmuck & Schultz, 2002). In this respect, the detrimental effects of one’s own environmentally risky behaviors can easily be doubted or ignored. Moreover, the externalization of ecological costs is affected by time and geographical shifts (Opotow & Clayton, 1994; Pawlik, 1991): The effects of CO₂ emissions, for instance, are not restricted to the local area, but might affect people far away from the polluter in terms of place and time, such as people living in other countries or belonging to future generations. In this respect, it is a rational choice for many polluters to continue their polluting activities as long as they do not have to expect sanctions for their abusive behavior (Montada & Kals, 2000; Müller & Hiendl, 2012).

This explains why solely appealing to actors’ long-term interests is not an effective intervention strategy for promoting sustainable behavior. Instead, pro-environmental behavior can be understood as moral behavior. The moral dimension of pro-environmental behavior was empirically confirmed on the level of cognitions as well as emotions: Concerning the cognitive level, it has been shown that experiencing moral obligations, accepting ecological responsibility, and perceiving ecological (in)justices form a strong motivational base for sustainable behavior (for an overview, see Stern, 2000) and help to overcome the socio-ecological dilemma. In general, the more the model variables are specifically tied to the ecological dimension, the more they become predictive for sustainable behavior. Dispositional constructs are less powerful. For instance, generalized social responsibility, often measured by the eight-item scale of Berkowitz and Lutterman (1968), evidences only low correlations with sustainable attitudes, and does not predict sustainable behavior (e.g., Arbuthnot, 1977; Tucker, 1978). A dispositional approach to explaining sustainable behavior therefore has been largely abandoned.

Similar result patterns can be found for egoism and altruism as personality traits. Often no significant correlations between egoistic or altruistic personality and various attitudes towards sustainability and sustainable behaviors can be found. This was, for example, examined by Russell (2001) in the context of climate protective behavior, like energy consumption in one’s household.

However, many of the studies are quite old, reflecting the overall shift from generalized to environment-specific moral attitudes and thus avoiding possible lower correlations and effect sizes caused by different levels of specificity of predictors and behaviors.

Nevertheless, a few general attitudes have proven to be powerful predictors of sustainable behavior. These are, for example, the belief in a just world, empathy, and control beliefs, which are part of the model of prosocial personality (Bierhoff, 2008) and which
were able to predict pro-social, including sustainable, behavior well. Following this tradition, the model of Stern (2000) distinguishes between egoistic, altruistic, and biospheric environmental concern. However, especially the biospheric concern seems to be positively related with sustainable behavior (e.g., Schultz, 2001).

Moral development in the context of ecological values, norms, and behavior represents another growing field of research. The development of an ecological ethics has been investigated referring to the change from materialistic to post-materialistic value orientations (Lantermann, Döring-Seipel, & Schima, 1992). Kohlberg’s model of moral development (1984) has been applied to pro-environmental, respectively sustainable, behavior from the very beginning of the emergence of environmental psychology (see Dispoto, 1977). In this approach, sustainable behavior is interpreted as a function of different developmental levels of moral judgment (see Eckensberger, Breit, & Döring, 1999). This is mainly assessed by Rest’s Defining Issues Test (DIT) to measure moral judgment (Rest, 1986; Rest, Narváez, Bebeau, & Thoma, 1999). The test embraces various moral dilemmas which do not include ecological or socio-ecological dilemmas. The DIT has been used in environmental psychology studies (e.g., Karpiak & Baril, 2008) or a modified test has been developed to specifically gauge moral reasoning related to environmental issues (e.g., Axelrod, 1994; Ojala, in press).

At a glance, confirmative result patterns can be found for this Neo-Kohlbergian approach (see Axelrod, 1994; Karpiak & Baril, 2008; Ojala, in press). For example, Karpiak and Baril’s (2008) study of college students showed that higher scores on moral judgment correlate positively with ecocentrism (belief in the intrinsic importance of nature) and negatively with environmental apathy. Even effects of moral judgment development on environmental behavior have been demonstrated (Ojala, in press). This reflects that more research needs to be done in this area.

In general, correlations between sustainable behavior and moral variables increase, when moral predictors are applied to ecological norms. For both Schwartz’s Norm Activation Model (Schwartz & Howard, 1980) or Stern’s Value-Belief-Norm Model (Stern, 2000), the acceptance of ecological norms and values as well as the internal attribution of environmental responsibility are the most decisive predictors of sustainable behavior (see Kaiser, Fuhrer, Weber, Ofner, & Bühler-Ilieva, 2001; Montada & Kals, 2000). The denial of environmental responsibility, or its exclusive attribution to powerful others, leads to environment-endangering decisions, for example, the promotion of economic interests regardless of their impact on nature, or an active engagement in motorsport activities (Montada & Kals, 2000).

The power of responsibility appraisals is bolstered by environment-specific justice appraisals. The more people perceive the socio-ecological conflict as a justice dilemma in which profits and sufferings are distributed unjustly, the more they are willing to contribute to the settling of this dilemma and to the (re-)establishment of justice (see Müller, 2012; Müller & Kals, 2007; Syne, Kals, Nancarrow, & Montada, 2006). This is particularly the case when ecological burdens affect future generations or people living in other geographical areas (e.g., in so-called underdeveloped countries), who have neither agreed to take the ecological risks nor profit in any way from taking these risks. A denial of these justice problems facilitates environmentally risky behavior (Horwitz, 1994; Opotow & Clayton, 1994; Syne et al., 2006).

In summary, across different action fields and heterogeneous samples, it has been shown that moral reasoning is a powerful motivational basis for overcoming interest shifts
described in the socio-ecological dilemma. This is in line with normative approaches, such as the “integrity of creation” or the “principle of responsibility” according to Hans Jonas (2012).

The building of behavioral decisions is, however, not a purely cognitive process, but is flanked by responsibility- and justice-related emotions, such as blame or indignation about insufficient sustainable behavior (for an overview, see Kals & Maes, 2002). These moral emotions should not be misinterpreted as “by-products” of dominant cognitions in such a way that they impair an apparently cognitive process of decision-making, but they seem to be a chiefly independent source of motivation (Haidt & Kezebir, 2010). This shows that in the field of sustainable behavior emotions arouse behavior in addition to rational cognitions by their affective, cognitive, and motivational component.

Affective connection to nature, also called emotional commitment to nature, emotional affinity toward nature, nature-relatedness, or inclusion of nature in self, is one of the very powerful emotions (see Clayton, 2003; Dutcher, Finley, Luloff, & Johnson, 2007; Kals, 2012; Nisbet, Zelenski, & Murphy, 2009). This construct can be traced back to Wilson and Kellert’s biophilia hypothesis (Kellert, 1997) and belongs to a completely different emotional category, which can explain sustainable behavior well—regardless of moral obligations (see Kals, Schumacher, & Montada, 1999). As the most strongly experienced and intimate of feelings, it is incompatible with the rational-choice theory referring to maximizing one’s own benefit on a rational decision base (see Coleman & Fararo, 1993), and its motivational functions can also not be explained by the concept of the socio-ecological dilemma. Affective connection towards nature can be traced back to present and past experiences in nature (Müller, Kals, & Pansa, 2009) and is closely related to the development of an environmental identity (Clayton, 2003; Hinds & Sparks, 2008). Data from questionnaire surveys have shown that the time spent in nature in one’s childhood as well as positive experiences in nature are strong predictors of the emotional connection to nature (Kahn & Kellert, 2002; Kals et al., 1999). In this respect, young people living in highly industrialized areas are not as emotionally connected to nature as people living in rural areas with a lot of nature surrounding them (see Hinds & Sparks, 2008; Müller et al., 2009). There is an ongoing debate as well as research on affective connection, increasingly confirming the power of this emotional bond with nature (Kals, 2012).

To what extent are the reported findings reflected in intervention programs? Aho (1984) presented a theoretical framework of education for sustainability with special focus on teaching pro-environmental action (concrete actions, decision-making, solutions, and choices). The author distinguishes between three psychological domains that need to be addressed in order to reach this aim: focusing (1) upon ethics and values (environmental values, ethics, responsibility, and attitudes), (2) upon cognitions (knowledge, understanding, cognitive processes, and skills), and (3) upon affections (experiences and emotions). These domains have significant overlap and interact with each other. Applying the previously reported findings to Aho’s three psychological approaches for promoting sustainable education, the literature on motives for sustainable behavior provides support for all of them: Any education or intervention strategy should equally take into account individual ethics and values, environment-specific cognitions, as well as emotions and nature experiences. These approaches are described in the following section in further detail.
SUGGESTIONS FOR EVIDENCE-BASED APPROACHES TO PROMOTE SUSTAINABLE THINKING, FEELING, AND BEHAVIOR

In this chapter, we suggest that sustainable behavior be considered a category of moral action that competes with other socially accepted behaviors, such as pursuit of economic growth. Thus, the question “How can sustainable behavior be promoted?” should be reformulated into “How can the socio-ecological dilemma and the interest conflicts that result from the three-dimensional concept of sustainability be overcome?” Under what personal and situational conditions is sustainable action prioritized?

The promotion of sustainable thinking, feeling, and behavior has primarily been done under a moral perspective. Based upon Rest’s four-component model (Rest, 1986), the perspectives of moral sensitivity, judgment, motivation, and moral character can be distinguished which all offer an important approach to promote sustainable behavior. Concerning these moral perspectives, cognitions and emotions with regard to ecological responsibility and justice seem to be most important. Models that refer to the specifics of these behaviors, such as Schwartz’s Norm-Activation Model (Schwartz & Howard, 1980) or Stern’s Value-Belief-Norm Model (Stern, 2000), successfully predict and explain sustainable decisions and behaviors. For intervention purposes, this result leads to the conclusion that responsibility- and norm-focused approaches should include a discourse on ecological, economic, and social responsibilities, and that ecological ethics, also called “green moral values” should be established (see Bassey, 1998). This could be done in families and institutions for early education (like kindergartens and elementary schools), high schools, post-secondary institutions, and the broader public.

Furthermore, the empirical findings on moral development suggest including discussions about environment-specific dilemma situations in intervention programs (see Thompson & Stoutemyer, 1991). The socio-ecological dilemma can be presented in many different forms. It may be experienced in fishing conflict games, either in a real or computerized learning environment (see, for example, Ernst & Spada, 1993). These approaches should address in the same way cognitions as well as emotions, like indignation about insufficient environmental protection shown by others in fishing conflict games.

As the dilemma situations are very complex, moral thinking should be combined with sustainable thinking (Spada, Opwis, Donnen, Schwiersch, & Ernst, 1990). Environmental psychology has contributed extensively to the body of knowledge on psychological barriers to promoting sustainable behavior (see Swim et al., 2010). One major barrier is the phenomenon of “limited cognition” (Gifford, 2011): Environmental problems are rather complex, and they involve many non-linear relations and a high degree of uncertainty about causes and effects. Individuals, however, as described, tend to act on a more short-term basis, neglecting the long-term effects of their behaviors. Moreover, perceived uncertainty can even serve as a justification for inactivity, and risks that are communicated as being uncertain tend to reduce willingness for action (Budescu, Broomell, & Por, 2009). Thus, education for sustainability has to face the double task of neither overwhelming individuals with too much uncertainty nor over-simplifying complex relations.

A supplementary way to fostering the moral perspective on sustainable behavior and to overcoming the gap between short-term self-interests and long-term interests of society is offered by positive nature experiences. Being in nature promotes the development of
an affective connection to nature, feelings of empathy toward, and identification with it. Connection to nature varies between individuals. It is primarily instigated by direct experiences in nature, such as viewing and experiencing wilderness, observing phenomena of weather, or perceiving the change of the seasons (Lyons & Breakwell, 1994). Most authors agree that this relatedness to nature becomes stronger the more concretely nature is experienced, and that it is based on affective experiences rather than solely cognitive appraisals (Nisbet et al., 2009), for example, when knowledge of nature is transferred by experiencing nature consciously with one’s five senses (Kaplan, 2001).

Connection to nature is especially promoted when nature experiences are shared with significant others (Kals et al., 1999). These joint experiences seem to facilitate the integration of this experience into one’s own self-concept and identity (Clayton, 2003). These significant others (at first, one’s parents) take on the role of transmitting nature values and enjoyment. The “significant others” change over one’s life span in such a way that family members are more and more replaced by peers. Therefore, the fostering of positive experiences within nature, preferably shared with significant others, is, even in environmental education programs for adults, a potent way to provoke interest and an affective connection to nature and to overcome the interest conflicts between short-term self-interests and long-term ecological interests of the society as a whole.

This last finding demonstrates that the implementation of the education programs needs to be done with regard to the specific circumstances and the social context in which they take place. Internal and external motivators influence one another in their effects and efficacy. If, therefore, not only the individual is in the focus of interest but if the environment is also shaped in such a way that sustainable behavior is promoted, effects are strengthened. This can be done on the situational level (e.g., by using prompts reminding of sustainable behavior) or on the social level (e.g., by the modeling behavior of respected others who, for example, demonstrate sustainable behavior or who enjoy the natural environment). On a more global level, the change of general conditions of relevant behavior, such as stricter laws, or prize and reward systems, should also be taken into account.

Comparing the sections on the motive structure of sustainable behavior with a possible derivation of intervention programs on the one hand and the earlier overview on current intervention programs on the other, the reader will recognize a gap: On the one hand, a profound knowledge base on the motives and motivation for sustainable behavior has been established leading to specific recommendations for intervention; on the other hand, practical intervention programs consist of patchwork elements only. Reasons for this discrepancy and suggestions how to overcome it are discussed in the following section.

**SUMMARY AND OUTLOOK**

The term of “environmental education” (later partly changed into “education for sustainability,” see above) was coined in the 1970s around the same time when environmental psychology was established as a scientific discipline. The beginnings of environmental education, however, can be traced back to the 1950s or 1960s (Eulefeld, 1990). A major contribution to the promotion of environmental education can be seen in the UNESCO conferences of the 1970s. They provided an impetus to make environmental education programs part of the general education process and to integrate it into school curricula.
Since then, many fine grained decisions of ministries of education in Europe have been made to achieve this aim (see Eulefeld, 1990). Parallel developments can be observed for the US, with some time lag, though.

Promoted by these political developments, many innovative programs have been developed all over the world, but mainly independently of the existing empirically confirmed knowledge base concerning motives and motivation for sustainable behavior. In environmental education, a research deficit has been recognized, concerning the content and implementation of programs as well as their effectiveness (see Bolscho & Hauenschild, 2006). This deficit needs to be overcome by focusing upon the specific competencies of the related disciplines. Two of the core contributions of environmental psychology can be seen in the provision of knowledge on the motivation base of sustainable behavior and on the effectiveness of intervention strategies. Environmental educators, on the other hand, are experts for the application of this knowledge in practical programs. Thus, environmental psychologists and educators need to collaborate for their mutual benefit, and they need to invite other disciplines such as sociology, political sciences, economy, nature sciences, engineering to achieve inter- or even transdisciplinarity (Schweizer-Ries & Perkins, 2012).

The relation between practice and science in the field of sustainability remains difficult, though. Two ways to justify environmentally related interventions can be differentiated: The first, basically scientific approach advises the traditional four steps of (1) formulating a problem definition (problem; P), (2) finding explanations for the problem (analysis; A), (3) developing and testing the process model (test; T), and (4) constructing an intervention program (help; H), which also includes the program’s evaluation (PATH-model of Buunk & van Vugt, 2008). The second approach, which is related to action research, is based on practical problems, where scientific knowledge is derived from the intervention process itself (Schweizer-Ries & Perkins, 2012). Both strategies have specific advantages and disadvantages. It may be politically opportune to directly start action-oriented with interventions and education programs to promote sustainable behavior, but these interventions should nevertheless be evaluated in order to gather feedback about the effectiveness of such programs and to have an impact on further theorizing, research, and intervention planning in the field of education for sustainability.

A clarification of the core concepts is much needed, in particular a working consensus of what is meant by “sustainability” and “sustainable behavior” has to be achieved on the level of examples and concrete behavioral decisions, also in order to avoid the described inflationary use of the terms. The concept of interactional expertise for sustainability education has been introduced to address this need (Berardy, Seager, & Selinger, 2011). A special focus is on the communication of sustainable research (Scott, 2006) to overcome the gap between research and practice, that is between primarily academic and socio-political objectives. Additional core competencies on joined thinking and dealing with uncertainty can be learned.

One way to concretize this interdisciplinary approach would be to promote approaches aiming to link the current need for action with the existing knowledge base of environmental psychology. A combination of both intervention paths may result: The practical requirements should be answered directly by offering education programs; in parallel, the underlying motives of sustainable behavior and the critical demand of networking and the handling of uncertainty should be analyzed further. Thus, we do not follow the argumentation that further research on the underlying motives of sustainable behavior
is necessary as a sine qua non to establish intervention programs. Of special help are the interventional approaches that aim to link theory and practice by founding their practical work on theories and psychological mechanisms. They help explain what sustainable thinking and behavior embrace on a meta-level (like valuing the different dimensions of sustainability and promoting a discourse to the individual case with respect to justice and necessary trade-offs) and they lead to the derivation of core competencies (like complex thinking). This practical work should be demand-driven (see Geesteranus, 1998), which implies that the impulse for conducting the program should arise from practical needs and underlines that the call from people working in the field of environmental education should be heard.

On a more general level, education for sustainability should be understood as a lifelong process: It should begin in kindergarten and pre-school, should be followed up in primary and secondary schools as well as in universities, and finally be disseminated into other areas of life. In schools this education for sustainability has not yet reached the level it should have, as environmental protection and sustainability are not at the center of the curriculum of any school subject. As a vision, even a school subject “sustainability” could be introduced in curricula (see Ahlberg & Leal Filho, 1998). This would not only strengthen the moral discourse and moral development but also cognitive development of students by introducing them to complex thinking.

In his book *Education for Sustainability: Becoming Naturally Smart*, Paul Clarke (2012) argues for a full transformation of schools and schooling that is required to reach the aim of education for sustainability. He bases his argument on the assumption that such education needs to be grounded in a comprehensive understanding of our relationship with the natural world. Although examples for integrating the concept of sustainability on the level of the nation’s or federal state’s curricula can be found nearly everywhere, the majority of schools are still far away from being green schools, as a place where sustainability is exemplified (for example by teachers’ or parents’ thinking and behavior) and successfully taught. Walter Leal Filho speaks of a vision of education and of a long-term goal on the level of world trends (Leal Filho, 2011). On a theoretical level, many papers discuss this global dimension and its specific challenges (see, for example, Ahmad, Soskolne, & Ahmed, 2012).

On the applied level of educational practice, there are many solitary struggles and attempts to tackle these challenges, but they are not sufficiently linked on national or even international levels. Environmental psychology and educational sciences can provide the knowledge required to define goals and establish appropriate means and strategies for these programs. Yet, the final responsibility for the realization of this global task remains with educational policies.

**REFERENCES**


