Introduction
During the past 50 years or so—depending on where one finds oneself on the globe it could be longer or shorter—a whole range of instruments and mechanisms have evolved to address the loss of nature, environmental degradation, or, in a more general and contemporary term, unsustainability. These instruments and mechanisms include socio-technological innovations (e.g., Spaargaren et al., 2006), legislation and law (see www.hg.org/environment.html for an overview), policies (e.g., Caldwell, 1984; Young, 1997), fiscal policy (e.g., Gupta, 2002; López and Toman, 2006) and economic incentives (e.g., Ekins, 2000; Mäler and Vincent, 2005; van den Bergh, 2002), and social marketing (e.g., McKenzie-Mohr, 2000). In addition, both in parallel and intricately connected, environmental communication, education, and learning have always played a role in finding an adequate response to what is nowadays seen as a global challenge. The significance of these learning-based instruments has varied, though, from country to country but also within countries over time. Historically speaking, one could say that there has been an evolution from nature conservation education to environmental education (EE) to education for sustainable development (ESD).

In this chapter a brief history of the role of education in living more sustainably on this planet will be provided. Two distinct vantage points that have major implications for the purposes, processes, and evaluation strategies deemed appropriate will be used: (1) an instrumental utilitarian perspective (emphasizing the potential of education in changing human environmental behavior in predetermined and more or less agreed upon directions. The emancipatory perspective, on the other hand, emphasizes the potential of education in strengthening people’s capacities and confidence to enable them to help determine how to live together in ways that do not further undermine the carrying capacity of the earth. Whereas the former, more behaviorist vantage point tends to have more support among environmentalists with a strong concern about the rapid loss of biodiversity, climate change, depletion of natural resources, and so on, the latter, more human development–oriented vantage point, tends to have more support among educators with a strong concern for self-determination, agency, and democracy. The chapter ends with the introduction of “post-normal” environmental education.

Key Words: environmental education, sustainable development, nature conservation education, emancipatory learning, instrumental learning, agency, participation, post-normal science
changing human environmental behavior in predetermined and more or less agreed upon directions) and (2) an emancipatory human development perspective (emphasizing the potential of education in strengthening people’s capacities and confidence to enable them to help determine how to live together in ways that do not further undermine the carrying capacity of the earth).

Nature Conservation Education

When trying to trace the beginnings of nature conservation education—while recognizing that such beginnings will vary from country to country—some scholars refer to events such as Petrarch’s climbing of Mont Ventoux centuries ago for no apparent reason other than to simply enjoy natural beauty and to experience the mountain just because it was there (O’Connell, 1983; Weiss, 2005). Others refer to the creation of national parks and state parks in many countries as a response to citizens’ becoming concerned about the loss of nature. In some countries, such as the United States, this has happened already, when Yellowstone National Park in was created in 1872 “to promote and regulate the use of the…national parks…which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (National Park Service, 1916). Similar movements took place at different points in time depending on a number of factors, including the prevailing political currents, the perceived pressures on what was considered nature or wilderness, and the power of the (mostly) elites who decided to spend much of their time and fortune on conservation. The national and state parks were often equipped with visitor centers to help visitors understand, appreciate, and protect nature as one of two main purposes along with nature conservation (Lemons, 2010). It must be noted here that nature conservation education and, more generally, the nature conservation movement as a whole tended to involve and engage the socioeconomically advantaged, paying little attention to those living in rural or urban poverty. Several scholars have discussed this issue; see, for instance, Henderson (1992) for an analysis of North America and Great Britain in this respect, Oyadomari (1989) for a Japanese perspective, or Spierenburg and Wels (2010) for a South African view of elitism in nature conservation.

A related but distinct nature conservation education stream emerged around the same time or shortly thereafter when nature conservation and nature studies became a subject in many public school systems, often as a component of science education (Bodzin et al., 2010). Schools began taking children on excursions or field trips to a local nature preserve or a local farm and tried to integrate such activities into the regular curriculum. In some countries special structures were designed to provide nature-oriented education for those, particularly young children, who were unable or hardly able to leave urban areas (Wals, 1982). In the Netherlands, for instance, the school gardens and city farms were created over 90 and 50 years ago, respectively, in cities such as The Hague, Rotterdam, and Amsterdam. Reconnecting citizens, children in particular, with nature and the sources of their food, and getting them into the outdoors, were some of the main objectives that in some cases intersected with an educational field that evolved in parallel: outdoor education (Rickinson et al., 2004). People with backgrounds mostly in natural resources, ecology, or forest management were often responsible for creating edutainment (forms of education that are not perceived as such by the learner) that made discovering, experiencing, and understanding the natural world both enjoyable and educational. Again it can be argued that schools paying attention to nature conservation, the outdoors, and the sources of food tended to be somewhat privileged, as they were able to provide and organize such educational experiences, whereas schools in poorer urban areas were not.

Much of this is still going on today, and is even getting renewed attention in countries where there is rapid urbanization and/or “virtualization” (e.g., human activity taking place in a virtual place), which results in a disconnect between people and the land (e.g., Louv, 2005; Kellert, 2005; Kahn & Kellert, 2002). Understanding and discovering nature and the web of life, how we affect nature and how nature affects us, where our food comes from, how our eating habits affect nature, and so on generally form the desired learning outcomes of these activities. In many urban areas around the world, these activities are increasingly connected to the rise of urban agriculture and the rebirth of school and community garden programs (e.g., Nettle, 2008; Doyle & Krasny, 2003). Another movement that seems to be supportive of nature (conservation) education can be coined the “nature as teacher” movement (e.g., Hall & Clover, 2005; Swan, 1992). Advocates of this stream claim that there are a lot of processes going on in the natural world that humans
can benefit from when seeking to live more lightly on this planet. Concepts frequently used by them include “resilience” (Krasny et al., 2010), “managing complex adaptive systems” (Allen et al., 1998; Rammel et al., 2007), and “ecological intelligence” (Goleman, 2009). The “nature as a teacher” movement represents a “worldview derived from living systems, a framework for thinking where connections and relationships are paramount, where waste equals food, where we learn from Nature to close the loops and move from a linear to a circular economy. Without such a new framework for thinking, young people are powerless in the face of looming resource depletion, climate change and societal disruption” (Walker, 2009, in reviewing the popular 2008 book Sense and Sustainability: Educating for a Low Carbon World by Ken Webster and Craig Johnson).

Although the level of government support has fluctuated over time, nature (conservation) education remains in place today, in part because of new justifications stemming from concerns about the decline of public health (e.g., the rise of obesity and ADHD) for which the outdoors and contact with nature are increasingly seen as providing a part of the solution. In the 1980s, well before the age of wireless and handheld technology, Kaplan and Kaplan pointed out that experiences in nature can restore people’s ability to concentrate. They introduced attention restoration theory (ART) to help explain this phenomenon (Kaplan & Kaplan, 1989). More recently this has been reaffirmed by Richard Louv (2005) in his popular book Last Child in the Woods, which details a number of additional benefits as well.

Environmental Education

Environmental education is obviously related to nature conservation education, but there is an important difference in that it transcends issues of nature, biodiversity, and ecology to also and foremost include issues of environmental degradation, environmental health, pollution, and so on that have a lot to do with the way we live, produce, and consume. There are many roots of environmental education and several founding “fathers” (Gough, 1994, 1997) who can be credited with promoting concepts of environmental education both within Europe and North America. Some refer to landmark publications such as Rachel Carson’s (1962) Silent Spring or the “Limits to Growth” report of the Club of Rome (Meadows et al., 1972) and environmental disasters such as the 1952 London smog disaster and 1969 burning of the Cuyahoga River in Ohio, as key triggers of an educational response to a looming environmental crisis. In North America, Bill Stapp’s coauthored article on “the concept of environmental education” in the first volume of the Journal of Environmental Education is often referred to as the starting point of environmental education (Stapp et al., 1969). Others might refer to key international conferences organized by UNESCO and UNEP (e.g., UNESCO-UNEP, 1978, 1997) on the relationship between humans and their environment and the role of education.

Many educational policies of a variety of governments across the globe call for the integration of EE in the formal education system. They stress the role of education in developing a support base for environmental policy and legislation, but also as a means to influence citizens’ environmental behaviors. At the same time business and industry have also discovered EE and, indeed, environmental communication as a public relations tool. Some sponsor the production of EE materials, some donate money to EE organizations, and some employ their own EE or environmental communication officers or consultants. It is clear that the worldwide development of EE in formal and nonformal education is ongoing. Perhaps it is useful here to make a distinction between EE and environmental communication. Whereas EE tends to focus on active learning processes, usually but not exclusively using formal education as a point of departure, that seek to engage citizens in environmental issues, environmental communication tends to focus on informing citizens about environmental issues or, more profoundly, persuading them to think or act in a certain environmental way. Environmental communication tends to take place outside of the formal education contexts. In this chapter, EE and its younger cousin, education for sustainable development, will be central. Both EE and environmental communication have their own scholarly journals and distinct but overlapping histories and conceptualizations. The relatively young Journal of Applied Environmental Education and Communication tries to bring the two fields together in one platform for both scholars and practitioners.

One could argue that with the emergence of EE about 40 years ago, nature conservation education gradually became a part of EE, although in many countries nature education (e.g., Sobel, 1996, 2008), biodiversity education (e.g., Gayford, 2000), and outdoor education (e.g., Redmond et al., 2009) continue to exist as educational approaches with nature as a focal point and as a backdrop for learning.
Outdoor education programs are somewhat distinct from nature education programs, as they tend to emphasize personal development over discovering, understanding, and connecting with nature. An analysis of the content of EE shows that there are at least two strands that differ in the emphasis placed on the importance of people's experiences with nature (Wals, 1994). One strand closely identifies with the purposes and contents of the original nature conservation education. Advocates of this strand maintain that without experiencing nature, people will not come to appreciate, value, and protect it. Since people are less willing to preserve or conserve what they do not appreciate or value, any environmental education program that does not provide learners with nature experiences is likely to fail. The development of values and an environmental ethic is oftentimes also considered foundational for citizens' environmental behavior (Stern & Dietz, 1994; Palmer, 2006). Development of a sense of place and connectedness to place is considered pivotal. A related spin-off of environmental education that makes this the central theme of all its activities is so-called place-based education (Gruenewald & Smith, 2008; Smith, 2002; Hutchison, 2004; Rosenthal, 2008).

Advocates of another strand hold that humanity is facing severe environmental deterioration deeply rooted in, among other things, inequity and "growth thinking" that threatens our very existence on this planet. They argue we need to act now and not shy away from addressing the root causes of environmental degradation that lie in how people, organizations, and companies behave and the kinds of values our economic systems promote at the expense of others (Huckle, 1999). Environmental education needs to focus on environmental problem-solving and has a responsibility in opening up avenues for critiquing existing value systems and economic models (see, for instance, Huckle, 1999; Plant, 1998). In this view, nature experiences are enjoyable and nature conservation is important, but if we are going to do something about things such as overpopulation, overconsumption, and runaway climate change, we need to directly address the local manifestations of these global problems in our schools and our nonformal and informal education. This strand of EE tends to be more politicized, as it often invites learners to reflect on and critique underlying, often taken-for-granted values that arguably cause these global environmental issues.

In both strands, somewhat conveniently juxtaposed here, there is a danger of environmental education becoming an instrument designed to influence people's values, moral position, and behavior in a predetermined and expert-driven direction. It is exactly this instrumental use of environmental education that is critiqued by those who emphasize that we are talking about education and not about training, conditioning, or even manipulation. Before discussing the different conceptualizations of "education" and "learning" within EE, the emergent field of education for sustainable development will be introduced, as it is increasingly seen as the modern interpretation or even the successor of EE.

**Education for Sustainable Development**

Education for sustainable development (ESD) is not so much rooted in local contexts and traditions, but rather can be seen as a result of international policy agreements and new forms of governance that emphasize citizen involvement in visioning and decision-making. Arguably ESD has its roots in Earth summits, such as the United Nations Conference on Environment and Development (UNCED), also referred to as The Earth Summit, which was held in Rio de Janeiro in 1992. and UNCED plus 10 which was held in Johannesburg in 2002, and related international documents and support structures, such as Agenda 21 (United Nations, 1992). The momentum created in the international policy arena led to the creation of the United Nations’ Decade of Education for Sustainable Development (DESD, 2005–2014), of which UNESCO is the lead agency. The history of this emerging field is thus far shorter than nature conservation education and EE and spans just over a decade. The current emphasis on sustainability, sustainable development, and sustainable life support systems, which recognizes the link between environmental and social equity, is leading to a shift, at least in some parts of the world, from EE to education for sustainable development (ESD).

In many countries ESD builds upon EE structures and policies that were already in place, sometimes well before the first Earth summit, held in Rio de Janeiro, Brazil, in 1992. This is especially the case in countries that interpret EE broadly to include social, economic, and political dimensions (e.g., in some Latin American and southern African countries). Lotz-Sisitka (2004) illustrated this when she wrote, “[Many African countries always have had a focus on] issues of development, survival, livelihoods, improved quality of education and improved quality of life, and more sustainable living practices. It is perhaps for this reason that environmental...”
educators in southern Africa have long been concerned with environmental education processes that are processes of social change” (p. 10). Similarly Brazilian Gadotti (2008) emphasized the political nature of societal change toward sustainability when arguing that current education and educational institutions pose barriers for moving toward sustainable development (SD) as they tend to reinforce the principles and values of an unsustainable lifestyle and economy. He argued for an economy that is not centered on free market, profit, and continuous growth. Instead he favored a “solidarity economy,” which incorporates principles of inclusion and social emancipation and identifies sustainability and solidarity are emergent and convergent themes. Gadotti proposed that without social mobilization against the current economic model, education for sustainable development (ESD) will not reach its goals.

The shift from EE to ESD is not entirely without controversy, as has been documented in an entire volume of the Canadian Journal of Environmental Education (2009), but also in the results of the online ESDebate on education for sustainable development (Hesselink et al., 2000), and more recently in the Mid-DESD review (Wals, 2009).

Interpretations of EE and ESD
There are different interpretations of ESD both in terms of content and educational process and in terms of how ESD relates to EE and indeed to other so-called adjectival educations, such as health education, citizenship education, global education, development education, consumer education, and the latest kid on the block, climate change education. There are narrow and broad interpretations of ESD, just as we have seen in the past with interpretations of EE. When viewed broadly, ESD stresses the link between the environmental and the socio-cultural, between the local and the global, the past-present and future, and the human and the non-human world. Narrow interpretations tend to emphasize the environmental and ecological dimension of SD.

Figure 32.1 illustrates how ESD and EE relate to each other from a content perspective. The figure shows that when both EE and ESD are interpreted broadly to include the political, social, cultural, and economic (EE+ and ESD+), they become almost synonymous. Interestingly enough, when interpreted narrowly (EE- and ESD-) to focus mainly on the environmental and the ecological, they also become almost synonymous. EE in the Tbilisi spirit (UNESCO-UNEP, 1978) is generally considered EE+, while ESD as described in UNESCO documents is generally considered ESD+ especially when related to all the Millennium Development Goals (and not just to MDG number 7, which focuses on environmental sustainability). In the middle of the figure, where ESD and EE appear most distinct, we find that EE is seen as strongly emphasizing the environmental and ecological dimension content-wise (the lower part of the circle), whereas ESD is seen as strongly emphasizing the political and socio-cultural, including the economic dimension content-wise (the upper part of the circle). Indeed there are countries around the world, such as the Netherlands, where there are separate EE and ESD policies that fall under the responsibility of different ministries.

Another way of looking at ESD and EE and the way they relate would be to look at the kinds of learning processes used and the type of aims pursued. A critical question that is continuously asked in EE and ESD but in other educational fields as well is: What are or should we be changing or developing in learners? Or, alternatively, how can we create optimal conditions and support mechanisms that allow citizens, young and old, to develop themselves in the face of change? The first question has instrumental connotations, whereas the second one has emancipatory ones. The difference between the questions may appear small but, as we will see, speak to a large issue (see also Wals & van der Leij, 1997; Jickling & Wals, 2008). When education in a range of settings, formal, informal, and nonformal, is employed to
somewhat affect citizens young and old, we need to ask questions about the role of education in society. There is no consensus about this role. Two perspectives are particularly relevant here: the instrumental perspective and the emancipatory perspective. Both differ in the degree to which the learners have a say in what and how they learn but also in what they are learning for. On the one extreme, education and learning are mostly expert driven (where there is a strong sense of what is “right,” what needs to be done, and a high degree of confidence and certainty in both the current knowledge base and the kind of behavior that is needed), while on the other extreme education and learning are mostly issue and process driven (where there is a strong sense of what is “right,” what needs to be done, and a high degree of confidence and certainty in both the current knowledge base and the kind of behavior that is needed). Both perspectives will be elaborated upon in the next sections.

An Instrumental Perspective

Around the world EE has first and foremost gained importance because of its potential to contribute to the resolution of environmental issues and not because of its potential to contribute to democratic and emancipatory human development (Wals et al., 1999). It can be argued that the environmental justification of EE has, at least until now, outweighed the pedagogical justification. Similarly, this is the case in ESD, although some would argue that the sustainability focus in ESD assumes that issues of democracy, equity, and participation “automatically” come into play.

Much EE around the world aims at changing learner behavior that often is broadly defined to include attitudes, beliefs, and values. Many EE researchers and practitioners are trying to instrumentally structure the content and process of EE by using hierarchical levels of universal goals and measurable objectives or learning outcomes (see, e.g., Hungerford & Volk, 1990). It is no surprise that within EE that seeks to change “learner behavior,” the establishment of knowledge and awareness of nature and environment, and the application of what is learned, are considered essential steps in the learning process. At the same time evaluation of the extent to which these goals are reached is considered crucial for determining the success of EE and for justifying government spending on EE. Early EE was informed by insights from behaviorist social psychology that assumed a more or less linear causality between environmental awareness and environmental behavior (Fishbein & Azjen, 1980) suggesting that an increase in environmental awareness would lead to more responsible environmental behavior. This assumed linearity between knowledge-awareness-behavior has shown to be weak (Hannigan, 1995, p. 236), and attitude-behavior models have since then been revised to include a number of additional factors and feedback loops (Azjen & Fishbein, 1980; Ajzen, 2008; Ajzen et al., 2009; Ajzen & Manstead, 2007; Fishbein & Azjen, 2010). Just providing information, raising awareness, and changing attitudes apparently is not enough to change people’s behavior. People’s environmental behaviors are far too complex and contextual to be captured by a simple causal model.

This complexity is illustrated by Glasser (2007), who showed that even though people have a familiarity with a problems related to what he calls eco-cultural unsustainability, they still choose to not respond or to respond ineffectively. He pointed out that citizens can have different predispositions toward unsustainability, including (1) having no idea that a potentially serious problem exists; (2) honestly believing that a “problem” is not a problem; (3) denying the existence of a problem by simply wishing it away or by ignoring the information (this includes educated incapacity, an acquired or learned inability to perceive a problem); (4) accepting the existence of a problem, but perceiving it as easily surmountable; (5) accepting the existence of a problem, but perceiving other problems or issues to take a higher priority; (6) failing to generate adequate support for action; and (7) taking action, but the chosen action proves to be inadequate, mismatched to the problem, or unsuccessful (Glasser, 2007, p. 55). He called for research that can help determine what learning levers might work best in overcoming these predispositions.

Two final observations about instrumental approaches to EE. First, the kind of research that takes place in this context can be called “evidence-based” for the most part, as researchers, commissioned by policy makers and funders of EE, tend to call for evidence that shows that EE is leading to more environmentally responsible behavior. Many studies have been conducted over the past 40 years or so to see how environmental education activities influence learner behavior (including knowledge, understanding, attitudes, awareness, values, actions, etc.); some examples can be found in Ramsey (1993), Ramsey & Hungerford (1989), Rickinson (2001), Hines et al. (1986), and Zelezny (1999). The number of longitudinal studies is rather limited, not in
the least because of the methodological challenges such studies encounter, but some are based on the analysis of significant life experiences (e.g., Tanner, 1980, 1998; Chawla, 1998a, 1998b) and on retrospective program evaluations (e.g., Kellert, 1998; Knapp & Benton, 2005, 2006). Liddicoat and Krasny (in press) discuss both strands of longitudinal research and discuss some of the methodological challenges which in part stem from the time that has passed since learners were engaged in EE activities and all that happened to them in between.

A second point to be made with respect to the instrumental perspective on EE is of a more political nature. Ironically, scholars from both the Left and from the Right have criticized EE that seeks to change learner behavior in a pre- and expertly determined direction. In the late 1990s people representing conservative think tanks provided some strong criticism of EE as they claimed the field was alarmist, anti-business, catastrophic, and unscientific (Sanera & Shaw, 1996; Sanera, 1998). Greg Smith (2000) pointed out that much of the criticism at the time appeared aimed at diminishing legitimate concerns about issues such as global climate change and biodiversity loss by focusing on the alleged failure of environmental educators to present conflicting scientific evidence, a failure linked to their avowed desire to turn their students into environmental activists. The conservative voices emphasized that EE should focus on facts and not on fear and that environmental educators should be educators, not indoctrinators. The response to this criticism was in part one of denial (we are objective educators, and we don’t focus just on fear but also on love for nature, etc.) and in part one of “throwing the ball back” by arguing that these conservative voices had their own political agenda, which was to represent the interests of big business. Criticism from another corner is best captured by the emancipatory perspective introduced in the next section.

An Emancipatory Perspective

Besides questions about the relationship between knowledge, awareness and understanding of environmental issues, and citizens’ environmental behavior, leading to some doubts about an instrumental focus of EE or ESD, for that matter, on these behavioral components, there are other concerns. These concerns come mostly from educators and/or critical pedagogues who challenge a focus of EE and ESD on behavioral change. They argue that education should above all be formative and focus on the kind of capacity-building and critical thinking that will help citizens understand what is going on in society, ask critical questions, and determine for themselves what needs to be done in light of inevitable uncertainty with respect to what is considered “right” (Mayer & Tschapka, 2008; Jickling & Wals, 2008). From this vantage point the idea of influencing people’s environmental behavior in a predetermined way contradicts the very foundation of education and borders on indoctrination.

Education is considered more literally in its original Latin meaning of educare, which is guiding into, facilitating, helping develop, and exploring the self and personal growth and competence development. As such, education is more about equipping people to make sense of the world and to make their own judgments.

If a key function of education is fostering self-determination, agency, and autonomous thinking about, among other things, environmental issues, then it would be contradictory to prescribe behavioral outcomes that a learning activity or sequence of activities needs to trigger. Instead, proponents of an emancipatory perspective argue that education, EE and ESD inclusive, has a role in developing so-called dynamic qualities (Posch, 1991): capacities or competencies that allow people to critique, construct, and act with a high degree of autonomy and self-determination. At the same time, such qualities are considered necessary for citizens to be able to cope with uncertainty, poorly defined situations, and conflicting or at least diverging norms, values, interests, and reality constructions. Posch (1991) wrote in an OECD-ENSI publication, “Professional, public and private life has become increasingly complex, with divergent and even contradictory demands on the individual [who lives] within an increasingly pluralistic value system. Above all, it is necessary to look beyond everyday normalities and to search for ethically acceptable options for responsible action” (p. 12). This is one of the things that sets education apart from training and conditioning and makes the prescription of particular lifestyles or (codes of) behavior problematic as it stifles creativity, homogenizes thinking, narrows choices, and limits autonomous thinking and degrees of self-determination.

So in short, an instrumental approach assumes that a desired behavioral outcome of an EE activity is known, is more or less agreed upon, and can be influenced by carefully designed interventions. An emancipatory approach, on the other hand, assumes that the dynamics in our current world are such that citizens need to become engaged in
an active dialogue to establish co-owned objectives, shared meanings, and a joint, self-determined plan of action to make changes they themselves consider desirable and of which the government hopes they ultimately contribute to a more sustainable society as a whole (Wals & Jickling, 2002). In terms of education process or the type of learning promoted, conventional interpretations focus on expanding knowledge and understanding through classic forms of instruction (transmission-based), which can be more easily linked to the instrumental perspective, and more contemporary ones that stress the importance of interaction, dialogue, reflection, and moving beyond the cognitive (transformation-based). The latter interpretations have a better fit with the emancipatory perspective. Again, similar patterns can be seen in the way EE has been interpreted over time along these two distinguishing features. Figure 32.2 shows that both EE and ESD can be interpreted more instrumentally and more emancipatorily and that the more emancipatory perspective tends to open spaces for new forms of learning, whereas the more traditional instrumental perspective tends to rely more on knowledge transfer, training, and instruction. The figure also shows that both EE and ESD can be interpreted in a similar way and when they are, they become synonymous (Wals, 2010).

Just like within the instrumental orientation, monitoring and evaluation (M&E) of EE and ESD activities is equally crucial within the emancipatory orientation. Typically M&E strategies that are appropriate for a more emancipatory orientation focus less on what changes in learners and more on the quality of the learning process and on the conditions under which the learning takes place (Wals et al., 2009). The question is not so much “How does this EE activity change the learner’s environmental behavior in all its expressions?” but rather “Are the conditions in which the learning activity takes place such that a change in learner behavior is likely in the first place?” M&E of this kind tends to be more of a formative (improving the processes and conditions) nature than of a summative nature (assessing the product of the learning). Emancipatory M&E strategies tend to be reflexive, with ample space for emerging questions, participant voices, collaborative learning, and the blurring of theory and practice (van Mierlo et al., 2010). A critique of the emancipatory orientation comes from policy makers who call for “hard” measurable results that show environmental improvement, which is not what this type of M&E tends to be after.

Post-Normal Environmental Education

The Risk Society

Both within EE and ESD, the emancipatory perspective appears to be gaining momentum, not only because it is education we are talking about, but also because of the seemingly inevitable lack of clarity and the uncertainty about what the “best” behavior is from an environmental or sustainability point of view. What if citizens who are taught to behave in a particular way find out later that this was not the “right” way after all? What if a certain behavior that might appear sustainable in one part of the world turns out to be highly unsustainable in another part of the world? This sentiment gained momentum when Ulrich Beck (1992, 2008) introduced the idea of the “risk society.” Beck argued that the principles on which our modern industrial society are founded, such as the need for continuous growth fueled by materialism and related consumerism, are beginning to turn against us. He introduced the idea of the “risk society” to indicate that lifestyles, behaviors, exploitation mechanisms, and production systems associated with the industrial society lead to more and more risks. Related trends, such as globalization and individualization, are compounding these risks and amplifying the complexity of society, resulting in increased insecurity and unpredictability.

Dillon and Wals (in press) pointed out that what is typical of the risk society is that this insecurity and unpredictability stem from unintentional and (in part) unforeseen changes to (eco)systems. Society is constantly in motion and citizens are facing problems and challenges for which there are no
ready-made solutions, such as Can organic agriculture feed the growing world population or is the use of genetically modified organisms inevitable? Is the increasing infertility in men a consequence of our modern lifestyles and eating habits? Is fertility in fact decreasing? Is there an ADHD epidemic or not? Has the Deepwater Horizon oil spill led to irreversible ecological damage or will nature heal itself? and so on, do not have single, simple, and agreed upon answers that lead to the associated desired behaviors that can be confidently prescribed (Wals & Dillon, in press). In their edited volume on education and climate change, Kagawa and Selby (2010) suggested that a risk society has consequences for the way we educate: “As a fundamental contribution to climate change [prevention and adaptation], it seems that educational spaces should build a culture of learning awash with uncertainty and in which uncertainty provokes transformative yet precautionary commitment rather than paralysis” (p. 243).

Environmental and sustainability issues have a number of characteristics that can be linked to Beck’s risk society, including:

- indeterminacy (the impossibility of knowing in advance what the best course of action is);
- value-ladenness (the crucial position of values in affecting behaviors, lifestyles, and systems);
- controversy (the lack and impossibility of full agreement or consensus among and even within all stakeholders);
- uncertainty (not being able to predict the exact or even near-exact impact of a chosen strategy or action);
- complexity (the messy interactions between variables or of a whole range of variables operating at different intertwined scales) (Peters & Wals, 2012).

Post-Normal Science

These characteristics have consequences for education, teaching, and learning in general but perhaps for those concerned with environmental and sustainability issues in particular. Funtowicz and Ravetz (1993) have introduced the concept of post-normal science to indicate that we are entering an era in which uncertainty, contestation, complexity, and indeterminacy are becoming the norm. Whereas in “normal” science the primary goal was to reduce and control uncertainty and complexity and to unveil universal truths that could authoritatively be disseminated without questions asked, this is no longer possible, if it ever was, and not even desirable. In post-normal science, uncertainty is not banished but is managed, and values are not presupposed but are made explicit (Funtowicz & Ravetz, 1993). Funtowicz and Ravetz (1993) suggested that active involvement of citizens in post-normal science aimed at situation improvement is crucial:

The dynamic of resolution of policy issues in post-normal science involves the inclusion of an ever-growing set of legitimate participants in the process of quality assurance of the scientific inputs…. In post-normal science, the manifold uncertainties in both products and processes require that the relative importance of persons becomes enhanced. Hence the establishment of the legitimacy and competence of participants will inevitably involve broader societal and cultural institutions and movements. (p. 753)

Agency and participation are key concepts from a post-normal science perspective.

Arguably agency and participation have been central concepts in strands of education as well. We can go back to John Dewey’s work almost 100 years ago. Dewey spoke of the role of democracy in finding balance between individualization and a sense of community and belonging. According to Dewey, democracy in education is crucial in realizing a sense of self, a sense of other, and a sense of community. Democracy in education, he argued, requires and creates space for self-determination, and greater degrees of autonomous thinking in a social context (Dewey, 1916/1966). In EE, too, agency and participation have been central concepts on the more emancipatory end of the continuum. Reid et al. (2008) edited an entire volume on participation and learning in the context of education in relation to environment, health, and sustainability. The post-normal perspective, however, provides a new perspective on participation and learning as the earlier-mentioned characteristics of environmental and sustainability issues call for new forms of interactions between a whole range of stakeholders representing numerous interests, values, and perspectives.

Learning in Post-Normal Times

Peters and Wals (2012) referred to a whole range of emerging forms of learning that appear highly relevant here, including trans-disciplinary learning (e.g., Klein, 2000; Somerville & Rapport, 2000), transformative learning (e.g., Cranton, 2006; Mezirow & Taylor, 2009), cross-boundary learning (e.g., Levin, 2004), anticipatory learning (e.g., Tschakert & Dietrich, 2010), action learning (e.g., Marquardt, 1999; Cho
& Marshall Egan, 2009), and social learning (e.g., Pahl-Wostl & Hare, 2004; Keen et al., 2005; Wals, 2007). These forms of learning show a high family resemblance in that they (see also Wals et al., 2009; Wals, 2010):

- consider learning as more than merely knowledge-based;
- maintain that the quality of interaction with others and of the environment in which learning takes place is crucial;
- focus on existentially relevant or “real” issues essential for engaging learners;
- view learning as inevitably trans-disciplinary, “transperspectival” and trans-boundary in that it cannot be captured by a single discipline and by a single perspective and that it requires “boundary crossing” (Blackwell et al., 2009);
- regard indeterminacy as a central feature of the learning process in that it is not and cannot be known exactly what will be learned ahead of time and that learning goals are likely to shift as learning progresses;
- consider such learning as cross-boundary in that it cannot be confined to the dominant structures and spaces that have shaped education for centuries.

Learning in post-normal times requires “hybridity” and synergy between multiple actors and the blurring of formal and informal education. Opportunities for this type of learning expand with an increased permeability between units, disciplines, generations, cultures, institutions, and sectors. Through this hybridity and synergy, new spaces might open up that will allow for transformation and situation improvement to take place. Such space includes space for alternative paths of development, space for new ways of thinking, valuing, and doing, space for participation minimally distorted by power relations, space for pluralism, diversity, and minority perspectives, space for deep consensus but also for respectful disagreement and differences, space for autonomous and deviant thinking, space for self-determination, and finally, space for contextual differences (Wals, 2010; Wals & Dillon, in press; Peters & Wals, in press).

Learning from a post-normal perspective, much like Mezirow and Taylor’s (2009) idea of transformative learning, is a process of “becoming critically aware of one’s own tacit assumptions and expectations and those of others and assessing their relevance for making an interpretation” (p. 4), “which enables us to recognize, reassess, and modify the structures of assumptions and expectations that frame our tacit points of view and influence our thinking, beliefs, attitudes and actions” (p. 18).

Post-normal environmental or, if you will, sustainability educators are beginning to pay attention to the rise of the cocreation of interactive methods and new forms of knowledge in policy-making and natural resource management involving a wide range of societal actors representing different interests, perspectives, and values but facing similar challenges. Although these differences are viewed as problematic by some, they are seen as crucial by others. Educational psychologists long have argued and shown that learning requires some form of (internal) conflict or dissonance (Berlyne, 1965; Festinger, 1957; Piaget, 1964). Exposure to alternative ways of seeing, framing, and interpreting can be a powerful way of creating such dissonance. However, for some this may lead to too much dissonance and a defensive response, which leads to a tighter hold on a person’s prior way of seeing things, while for others it might lead to a reconsidering of one’s views and the adoption or cocreation of a new one. When introduced carefully, dissonance can lead to, to borrow a key concept from Martin Scheffer (2009), a tipping point in one’s thinking. Such tipping points appear necessary to generate new thinking that can unfreeze minds and break with existing routines and systems (Wals, 2010). Recently Krasny, Plummer, and Lundholm (2010) edited a collection of papers in the journal Environmental Education Research on what the field of EE can learn from resilience in social-ecological systems.

Based on a synthesis of contributions to an edited volume on social learning toward a sustainable world, Wals (2007) distills four features of social learning that appear promising in the context of learning and educating in times of uncertainty and the looming sustainability crisis: (1) the value of difference and diversity in energizing people, introducing dissonance, and unleashing creativity; (2) the importance of both reflection and reflexivity; (3) the power of social cohesion and social capital in creating change in complex situations loaded with uncertainty, and (4) the power of collaborative action that strengthens the (unique) qualities of each individual. As sustainability and sustainable development are increasingly seen as emerging properties of collaborative learning, the creation of a more sustainable world above all requires learning, and not just any learning, but learning that leads to a new kind of thinking, alternative values, and cocreated, creative solutions, co-owned by more
reflexive citizens, living in a more reflexive and resilient society.

**Monitoring and Evaluation**

In this chapter a distinction has been made between instrumental and emancipatory interpretations of EE and indeed of its younger cousin ESD. Both strands are pursuing different types of goals and therefore will require different monitoring and evaluation strategies. The post-normal perspective introduced in the previous section aligns better with emancipatory interpretations of EE, as it sees sustainability and sustainable living as relational, emergent, dynamic, and inevitably indeterminate. As a result, post-normal monitoring and evaluation strategies tend to focus on the quality of the processes taking place and of the conditions under which these processes take place. The question is not so much "Are people developing the attitudes, social norms, values, behaviors, and so on that we have identified as the ones that are most desirable?" but rather "Are the conditions under which participants live, work, create, and so on together such that they become actively engaged sustainability issues and more competent in dealing addressing them?" The former, more instrumental question is of a more summative nature, whereas the latter is more of a formative nature in seeking to optimize the conditions for learning and building capacity.

But how can we know whether the capacity of individuals, organizations, and networks for contributing to social learning processes that are aimed at sustainable development are actually being developed and utilized? The learning process of the actors, organizations, and networks often generates all kinds of "soft" results that, at first glance, appear to have little to do with sustainability but may be essential to creating a sustainable society (consider: social cohesion, empathy, involvement, cooperation, and the like; Wals, 2007; Wals et al., 2009). Taking these "soft" results seriously has implications for the way policies aiming to move communities, organizations, citizens, and so on toward sustainability are framed. The policy of, for example, a municipality or a company should not only include measurable and tangible outcomes using sets of indicators but also include a number of clear-cut and accountable process goals. Factors such as reducing the amount of litter in the neighborhood or saving energy within a company can be made measurable. Even matters such as "a sustainable neighborhood" and "corporate social responsibility" can be made measurable by means of checklists and indicators, particularly when these checklists and indicators are the result of an interactive process involving those who will be working with them. After all, those who have compiled the indicators and checklists have already experienced a learning process, which is possibly an essential condition for internalization and creating ownership of such indicators and checklist.

Table 32.1 shows that the manner in which the results are to be achieved can be predetermined or determined interactively—that is, determined by those immediately concerned in the neighborhood or company. The same is also true for the process used in meeting some environmental or

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**Table 32.1 A Typology of Evaluation Strategies**

<table>
<thead>
<tr>
<th>Process is predetermined</th>
<th>Process is determined interactively</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy results are predetermined</strong></td>
<td><strong>Type 1: Highly instrumental</strong> Information campaign &quot;Litter in the neighborhood,&quot; the goal of which is to reduce litter by 50% within one year.</td>
</tr>
<tr>
<td><strong>Policy results are determined in the course of the process</strong></td>
<td><strong>Type 2: Mix</strong> Residents are challenged to come up with a plan to reduce litter in the neighborhood by 50% within one year.</td>
</tr>
<tr>
<td><strong>Type 3: Mix</strong> The municipality, without establishing ahead of time which level of reduction is to be realized, starts a campaign against litter in the neighborhood, in the course of which (by means of waste monitoring) it becomes clear which results are feasible, in which respect variations from one neighborhood to the other are possible/acceptable/encouraged.</td>
<td></td>
</tr>
<tr>
<td><strong>Type 4: Highly emancipatory</strong> The municipality, by means of neighborhood surveys and consultations with the residents, determines which aspects of liveability and/or sustainability are to be given priority in the neighborhood. These themes are then worked out interactively.</td>
<td></td>
</tr>
</tbody>
</table>
sustainability challenge. One can hardly call something a social learning process when both the results (goal) and the process (means) have been determined beforehand by policy makers, experts, or management. The other combinations offer more room for social learning, either aimed or not aimed at predetermined and measurable goals.

Three of the four cells in Table 32.1 refer to environmental results (less litter). The fourth cell (bottom right) does not specify a concrete environmental result. That cell refers mainly to the commitment on the part of people. It is precisely this kind of result that may, in the long term, lead to social cohesion, cooperation, and a sense of community, for example. Changes of this kind are perhaps a prerequisite if one is to come to solutions for problems/challenges that are much more complex and that are oriented more toward sustainability than aimed only at reducing litter. Depending on the way an intervention is organized, there will be less or more room for social learning. The space available for social learning determines the extent to which spin-off results can be generated in a more social sphere but also in terms of collaborative cocreated, self-determined action.

A number of differences between a mainly results-oriented evaluation process (results in terms of hard sustainability indicators) and a mainly process-oriented monitoring process are set alongside one another in Table 32.2.

Within the field of EE, but certainly also in other fields, a range of participatory forms of research can be found, such as action research (Reason & Bradbury, 2001), citizen science (Irwin, 1995), and trans-disciplinary research (Hadorn et al., 2008). Furthermore, new forms of so-called reflexive monitoring and evaluation are sprouting across the globe that can be labeled “post-normal” and transformative. Examples include reflexive monitoring and evaluation, developed by Wageningen University and the Free University of Amsterdam (van Mierlo et al., 2010) and so-called realist evaluation, developed by Pawson and Tiley (1997). These new forms of monitoring and evaluation are also currently being introduced in the field of EE (e.g., Raven, 2006) and will need to be developed further in the years to come.

**Conclusion**

Environmental education finds itself in a transition period. On the one hand there is a reconceptualization of the focus and content of EE inspired by emergent sustainability thinking; on the other, the current risk-society calls for new forms of learning and governance that are better able to deal with risk, complexity, uncertainty, value dilemmas, and conflicting interests. Given the continued disconnect between people and their physical environment in general and with nature in particular, the continued decline of the state of the planet, and the increase in unsustainable lifestyles, the need for EE and its younger cousin ESD remains unquestioned. There are a number of questions, though, about the field’s effectiveness in responding to environmental and sustainability challenges, and the appropriateness or adequacy of past research attempts for being able to show such effectiveness in the first place, but also about the field’s innovation capacity. The latter calls into question whether the field is sufficiently outward-looking to be able to renew itself in post-normal times. Part of this renewal will lie in shifting its learning goals from changing individual behaviors to changing lifestyles and building capacity. A post-normal perspective has been introduced to emphasize that EE has a role to play in “boundary crossing” between institutions, schools, communities, and disciplines, and in connecting a range of societal themes that all relate to sustainability (health, peace, well-being, exposure to nature and green spaces, climate, biodiversity, food safety and food security, disaster responsiveness, etc.). Such a role assumes new competencies on the part of the educator, who becomes a facilitator of social learning and a director of hybrid learning configurations consisting of likely and unlikely coalitions of societal actors.

**Future Directions**

In this chapter a kind of evolution has been sketched from nature conservation education to environmental education to education in the context of sustainability. One commonality between them is the importance of connecting with the world (nature, environment, planet). Earlier in the chapter place-based education was referred to as a related form of education that specifically focuses on helping people ground, root, and connect with a locality, a place, a space to which they belong and feel connected, for which they care, and so on. Such contextual forms of education are receiving increased attention from educators and policy makers as a means to help people, young and old, reconnect with the physical, material, and socio-ecological world they, oftentimes unconsciously, inhabit. There is a whole body of scholarly work emerging, some of which this chapter referred to...
earlier on, that suggests that (re)discovering and (re)connecting with place can be restorative (therapeutic, healing, etc.), generative (leading to new ways of seeing, sensing, experiencing), and empowering by enabling people to shape and care for a place. In the near future the field of EE will need to consider a hegemonic trend that affects the entire globe: the exponential growth of highly invasive and, indeed, addictive hypermedia and associated information and communication technologies. Whereas place-based education, and to a lesser degree perhaps the field of EE as a whole, operates somewhere in the margins of education in the effort to reconnect people with the physical space around them, this hegemonic trend seems to do the exact opposite, only in a much more forceful way. Educators in general and environmental educators in particular need to ask themselves what the implications are of the

Table 32.2 Juxtaposing Two Types of Monitoring & Evaluation (Source: Wals et al., 2009, p. 27)

<table>
<thead>
<tr>
<th>Instrumental approach (focus on determining results)</th>
<th>Social approach (focus on improving the process)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main goals</strong></td>
<td><strong>Main goals</strong></td>
</tr>
<tr>
<td>- determining the (policy) goal range</td>
<td>- determining the course of the process</td>
</tr>
<tr>
<td>- accountability toward commissioning party</td>
<td>- improving the quality of the project realiza-</td>
</tr>
<tr>
<td>- accountability government toward society</td>
<td>tion process</td>
</tr>
<tr>
<td></td>
<td>- collectively learning from joint experiences</td>
</tr>
<tr>
<td><strong>Role externals</strong></td>
<td><strong>Role externals</strong></td>
</tr>
<tr>
<td>- expert role</td>
<td>- role of facilitator and coach</td>
</tr>
<tr>
<td>- external observation</td>
<td>- participatory observation</td>
</tr>
<tr>
<td>- determining measuring system to be used</td>
<td>- determining measuring system and indicators</td>
</tr>
<tr>
<td>- determining indicators</td>
<td>together with actors</td>
</tr>
<tr>
<td>- measuring, analyzing, and interpreting data</td>
<td>- making the process that is being completed</td>
</tr>
<tr>
<td>- reporting</td>
<td>visible and its progress</td>
</tr>
<tr>
<td></td>
<td>- enticing and equipping actors for</td>
</tr>
<tr>
<td></td>
<td>self-evaluation and monitoring</td>
</tr>
<tr>
<td><strong>Role of actors</strong></td>
<td><strong>Role of actors</strong></td>
</tr>
<tr>
<td>within the M&amp;E process</td>
<td>- sources of information (data) for the</td>
</tr>
<tr>
<td></td>
<td>external M&amp;E-specialist (one-sided)</td>
</tr>
<tr>
<td></td>
<td>- involving participants in discussions on</td>
</tr>
<tr>
<td></td>
<td>(perceived) changes and experiences with the</td>
</tr>
<tr>
<td></td>
<td>process (interactive)</td>
</tr>
<tr>
<td><strong>For whom?</strong></td>
<td><strong>For whom?</strong></td>
</tr>
<tr>
<td>- sponsors, commissioners, and ultimately</td>
<td>- all those involved in the process of change</td>
</tr>
<tr>
<td>the public</td>
<td>(commissioning party is also one of the actors)</td>
</tr>
<tr>
<td></td>
<td>- actors may interpret things differently</td>
</tr>
<tr>
<td></td>
<td>- holistic: search for meaning, connections and</td>
</tr>
<tr>
<td></td>
<td>relations</td>
</tr>
<tr>
<td></td>
<td>- reality can be interpreted in various ways</td>
</tr>
<tr>
<td></td>
<td>- room for subjectivity but…striving for inter-</td>
</tr>
<tr>
<td></td>
<td>subjectivity: collective interpretation of what</td>
</tr>
<tr>
<td></td>
<td>has happened</td>
</tr>
<tr>
<td><strong>Underlying worldview</strong></td>
<td><strong>Underlying worldview</strong></td>
</tr>
<tr>
<td>- empirical-analytical/understanding through</td>
<td>- empirical-analytical/understanding through</td>
</tr>
<tr>
<td>reduction, search for explanations (if—then),</td>
<td>reduction, search for explanations (if—then),</td>
</tr>
<tr>
<td>striving for objectivity and independence</td>
<td>striving for objectivity and independence</td>
</tr>
<tr>
<td></td>
<td>- risks are random indications and depend upon</td>
</tr>
<tr>
<td></td>
<td>the reliability and validity of the</td>
</tr>
<tr>
<td></td>
<td>instruments used</td>
</tr>
<tr>
<td></td>
<td>- M&amp;E is mainly of interest to one party only:</td>
</tr>
<tr>
<td></td>
<td>the commissioning party, and is</td>
</tr>
<tr>
<td></td>
<td>mainly used for strategic purposes</td>
</tr>
<tr>
<td></td>
<td>- commissioning party views the results as non-</td>
</tr>
<tr>
<td></td>
<td>scientific; use of methods that yield significant stories of all of the interested parties</td>
</tr>
<tr>
<td></td>
<td>- intensive monitoring of the process of change</td>
</tr>
<tr>
<td></td>
<td>and aspiring after inter-subjectivity is time-</td>
</tr>
<tr>
<td></td>
<td>consuming</td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
<td><strong>Advantages</strong></td>
</tr>
<tr>
<td>- survey able, can be well planned, relatively</td>
<td>- survey able, can be well planned, relatively</td>
</tr>
<tr>
<td>inexpensive, appealing to policy (particularly</td>
<td>inexpensive, appealing to policy (particularly</td>
</tr>
<tr>
<td>within the short policy cycles)</td>
<td>within the short policy cycles)</td>
</tr>
<tr>
<td></td>
<td>- all of the participants can benefit from the</td>
</tr>
<tr>
<td></td>
<td>process (can contribute to the professional</td>
</tr>
<tr>
<td></td>
<td>development of those involved)</td>
</tr>
<tr>
<td></td>
<td>- renders possible a long-term perspective</td>
</tr>
<tr>
<td></td>
<td>- M&amp;E stimulates the learning process and</td>
</tr>
<tr>
<td></td>
<td>provides insights for the benefit of other</td>
</tr>
<tr>
<td></td>
<td>similar projects and upscaling</td>
</tr>
</tbody>
</table>
The age of wireless, hypermedia, and information and communication technologies (ICTs) for teaching and learning, but also for the way people “relate” to each other and to nature and the planet as a whole. Strangely, even though educators themselves are also inundated by these new ICTs in both their personal and professional lives, this question has hardly been raised so far. The field of EE will need to consider the impact of ICTs and hypermedia on people’s sense of place and the implications for teaching and learning. Only then can environmental educators begin to create educational responses that may critically take advantage of elements of the ICT revolution, which can help restore the current disconnect between people and place.

Finally, the shift to capacity-building and competence for a more sustainable world raises questions about what such capacities or competencies entail, how they can be developed, and how they can be assessed. Some work has been done on what is called sustainability competence (e.g., de Haan, 2006, 2010; Wals, 2010) but this work is still in its infancy. Key components that have emerged so far include “integrative thinking” with references to systems thinking and holistic thinking; empathy for perspectives, values, and so on other than one’s own; and Gestalt-switching (Wals, 2010), which refers to the ability to switch back and forth on a number of continua: spatial (local-regional-global), temporal (past-present-future), cultural, disciplinary, ethical, and so on. More research and thinking need to be done about this type of capacity-building and competence development.

References


Gestalt-switching (Wals, 2010), which refers to


