

Education for Sustainable Development in the United States of America

A report submitted to the
International Alliance of Leading Education Institutes

Initial draft completed 19 May, 2009

Revised 19 July, 2009

Released 19 August, 2009

Noah Feinstein

Department of Curriculum and Instruction
University of Wisconsin-Madison School of Education



INTERNATIONAL ALLIANCE OF LEADING EDUCATION INSTITUTES

This report describes the status of Education for Sustainable Development (ESD) in the United States of America. It was completed in 2009 as part of the work of the International Alliance of Leading Education Institutes (<http://www.intlalliance.org/alliance.html>), and is one of ten such national reports. In response to the Alliance's charge, this report focuses on formal (school-based) education at the primary and secondary levels. It addresses theoretical concerns as well as research results and the practical realities of American ESD.

The first section introduces the national context, focusing in particular on the decentralized nature of American education governance. It also reviews the history of ESD in the United States and outlines the general trend of growth and diversification. The second section describes in greater detail the historical and contemporary influences on American ESD, including federal and state governments and an array of non-governmental organizations. In the absence of a coherent national strategy for ESD, this section attempts to summarize what American ESD is and is not, and how it got that way. The third and final section offers a selective (rather than comprehensive) tour of research and practice in ESD, commenting on the status of ESD-related curricular and pedagogical models as well as teacher education and whole-school reform.

Table of Contents

PART 1: THE NATIONAL CONTEXT	1
Preface: The United States of America	1
Is there no such thing as ESD in the United States?	1
Decentralization and the nature of federal influence on education	2
Historical roots of ESD in the US Environmental Education movement	3
The overall picture: Multiple influences on ESD	4
PART 2: THE CONCEPTION OF ESD IN THE UNITED STATES	5
Layers of ESD governance	5
ESD and Sustainable Development at the federal level	5
ESD and Sustainable Development at the state level	18
The role of Non-Governmental Organizations	21
PART 3: THE CONCEPTION OF ESD IN THE UNITED STATES	28
Critical context: EE, ESD and schooling	28
The state of practice in ESD curriculum and pedagogy	28
Research on ESD curriculum and pedagogy	33
ESD and teacher education: Research and practice	36
The whole-school approach to ESD	38
Concluding notes	40
BIBLIOGRAPHY	42

Part 1: The National Context

Preface: The United States of America

The United States of America is frequently described in superlatives: it has the largest economy of any nation in the world, the most powerful military and (by some reckoning) the most venerable continuously operating democracy. It is among the largest countries in the world in terms of both geographic area and population. It is also among the most culturally and ethnically diverse, a product of massive historical and contemporary immigration from every corner of the globe. In the past century, Americans have increasingly become an urban people, with 79% of the nation's population living in cities and suburbs at the time of the last census (US Census Bureau, 2000). The United States has a highly productive agricultural sector, vast natural resources, and a proud tradition of scholarship and technological innovation.

In the realm of environmental policy and sustainable development, a less proud set of superlatives can be applied. The United States has the highest *per capita* rate of carbon dioxide emissions. It was the greatest overall emitter of carbon dioxide until recently, when it was surpassed by the People's Republic of China. It is the greatest *per capita* producer of municipal waste and of nuclear waste. Although the United States was a cradle of the environmental movement, it has not been a global leader in environmental policy for many years. A close examination of American environmental policy reveals little trace of a national agenda for sustainable development.

Part of this is due to the structure of the American government, which is characterized by a careful balance of powers designed to prevent the concentration of authority in one person, party or agency. The primary manifestation of this is the *federal* nature of governance, in which a national government (often referred to as the federal government) has authority over some regulatory domains specified in the American Constitution, while the remaining domains are regulated independently by the fifty states. Public education, as will be discussed below, is *not* within the regulatory domain of the federal government. The federal government itself is divided into executive, legislative and judicial branches, a system which is reiterated in each state. Although much could be said about this division of powers, the single most relevant factor for the purposes of this report is the inability of the executive branch, led by the president, to create new laws. The president sets a legislative agenda, but it is the legislative branch, whose members represent their states and regions, that crafts and approves (or rejects) new laws. This limitation on executive authority, combined with the delegation of many powers to the states, mean that *national* agendas have a highly attenuated influence on, for example, educational practice.

Is there no such thing as ESD in the United States?

There are two factors that make it difficult to summarize the status of education for sustainable development (ESD) in the United States. The first factor is the *administrative decentralization* of the US education system. Decisions about education are often made at the state or local level, and there are few aspects of American education for which a national agenda directly shapes either curriculum or pedagogy. Thus, although there is no national agenda for ESD – at least, no agenda that has the status of law – neither is there a clear, centrally determined agenda for education in the traditional disciplines.

The second factor, which exerts an equally large influence on American ESD, is the *nomenclatural diversity* of ESD in the United States. Educational projects that have some or all of the hallmarks of

ESD are promoted and conducted under many different names. The most obvious of these is environmental education (EE). There are also strong ESD-relevant projects associated with civic education, place-based education, and education in the traditional academic disciplines (particularly the natural sciences, social sciences and history). Even the projects that correspond best with international principles of ESD typically bear a slightly different name: *education for sustainability*.

In this context, it would be possible to examine the American educational landscape and conclude that there is no national agenda for ESD and little in the way of ESD taking place in schools. Such an assessment would miss the rich but uneven tapestry of educational thought and action directly relevant to ESD. This report focuses on activities that bear the name ESD, but it also attempts to transcend issues of decentralization and nomenclature by considering some particularly relevant projects that have proceeded under other names, particularly *education for sustainability* and environmental education, as well as projects at the local or regional rather than national scale. For scholars and practitioners of EE, this report may feel incomplete. Although it draws on the EE research literature to a limited extent, it does not make an effort to synthesize or summarize that literature in any comprehensive way. Scholars and practitioners of peace education, civic education and the like will also notice the omission of relevant work from their fields. Thoroughness was too great a goal for the scope of the work; usefulness, hopefully, was not.

Decentralization and the nature of federal influence on public education

In the United States, the federal government has very limited constitutional authority to regulate formal education. This authority devolves upon the states, which set educational agendas according to local political will. Although the historical trend is one of convergence, with states becoming more similar in the way they organize and regulate education, there are still meaningful differences in the way formal education is funded and administered from one state to the next. Even basic parameters, such as the minimum and maximum ages of compulsory schooling, vary from state to state. To further complicate the picture, the states themselves exercise different amounts of control over formal education. In “local control states,” such as Colorado, school districts¹ make many programmatic decisions about curriculum and pedagogy.

Despite the legal emphasis on local control, federal authorities are often able to influence primary and secondary education by attaching restrictions and conditions to federal funding for education. For most of the history of the United States, federal funding for public education was nearly non-existent. This changed in 1965, with the passage of the Elementary and Secondary Education Act. A key part of then-President Lyndon Johnson’s “war on poverty,” the Act provided significant funding for (among other things) public schools that served low-income children. It was initially authorized for a limited term of five years, but has been periodically re-authorized ever since. Since Johnson’s time, local educational authorities, particularly those that serve high-poverty populations, have come to depend on federal funding. This dependence enables the federal government to exert a disproportionate influence through a comparatively small financial investment (less than 10% of total expenditures on public primary and secondary education). Although it was not President Johnson’s original purpose in sponsoring the legislation, the Elementary and Secondary Education Act has substantially increased federal involvement in, and influence over, public education in the United States.

¹ The school district is a regulatory unit encompassing the network of primary and secondary schools associated with a town, city or settled region. Districts vary enormously in size—at one extreme, the entire city of Los Angeles is comprises a single district—and in the type of control they may exert over formal education.

For the past two decades, the federal government has used this influence to push a program of “standards-based reform.” In its most recent incarnation, the No Child Left Behind Act of 2001, states only receive federal funding if they establish academic standards in key areas (reading, mathematics and science) and track the progress of each school relative to those standards. Each state is permitted to set its own standards, but all states are required to enforce their standards by penalizing schools that do not meet yearly goals. This reform strategy has had a number of consequences for American public education, but two in particular are worth noting because of their relevance to ESD. First, the emphasis on achievement in a few of the traditional academic disciplines has caused schools across the country to divert time and resources *toward* those disciplines and *away from* cross-disciplinary programs and disciplines (such as history) that are not included in the annual yearly progress measures (King and Zucker, 2005). Second, the need to test students and monitor test results has forced each state to develop a substantial bureaucracy for testing, and each school to devote a correspondingly large amount of time and attention to administering the tests (Zellmer, Frontier and Pfeifer, 2006). Resources devoted to testing are typically taken away from instruction, and pressure to achieve high test scores has the predictable consequence of discouraging innovations not directly related to those outcomes. Both consequences of standards-based reform have made American schools less hospitable for ESD.

Historical roots of ESD in the U.S. Environmental Education movement

American ESD has its roots in education movements that date back over a century. The most widely known of these is the Nature Study movement that began in the 1890s and continues, in a somewhat attenuated form, to the present day. Nature Study is often described as the direct predecessor of environmental education in the United States (Disinger, 2005). An educational movement that is less widely recognized but has at least as much in common with contemporary ESD is Conservation Education, which arose from the agricultural reform projects of the 1920s and 1930s. During these decades, the United States federal government responded to the crisis of widespread soil erosion by founding the Soil Conservation Service—an administrative entity whose mission was to transform agricultural practice through education and demonstration projects (NRCS, 1995). Although the word “sustainability” was never applied to these projects, the idea of preserving the agricultural viability of the land for future generations is obviously compatible with contemporary notions of sustainable development.

More recently—but still half a century ago—William Stapp and his students coined the first formal definition of environmental education (EE). Stapp went on to play a key role in organizing the UN-sponsored conferences on environmental education in Belgrade (1975) and Tbilisi (1977). Although many researchers and educators have remarked on the conceptual differences between EE and ESD (McKeown and Hopkins, 2003; Bonnett, 2002), there can be little doubt that contemporary ESD projects in the United States and elsewhere are the direct descendents of these early efforts.

In evaluating the status of American ESD, EE deserves special consideration. Grassroots EE projects have proliferated in both formal and non-formal educational contexts, and EE has achieved a degree of mainstream acceptance, though it remains peripheral to public education at the primary and secondary levels. Many educators pursuing ESD-related projects in the United States identify their work as environmental education. When state-level educators and administrators were contacted for this project, many of them responded to questions about ESD with references to EE. Although ideological divisions and nomenclatural preferences persist, most American *practitioners*

of EE and ESD agree that their work is of mutual interest, draws upon overlapping content and pedagogical techniques, and serves similar if not identical ends.

The overall picture: Multiple influences on ESD

Although the United States has no national agenda for ESD, and little educational work takes place under that name, many American researchers and practitioners have contributed to ESD at an international level. For example, the ESD toolkit developed by Rosalyn McKeown and her collaborators (McKeown, 2002) has been translated into Spanish, Urdu, Chinese and other languages, and adopted as a teaching tool and program manual around the world. Intended to help new programs understand and apply ESD in locally suitable ways, the toolkit has probably had a far greater impact outside of the United States than within the country. This is emblematic of the paradoxical situation in the United States, where the formidable expertise of individuals and groups is not yet reflected in system-wide change.

American ESD is growing slowly but steadily. Its growth has been shaped by three types of institution: environmental regulatory agencies at the federal level, educational regulatory agencies at the state and local level, and non-governmental organizations of varying scope and ambition. Federal agencies have typically played a background role, establishing and supporting ESD-related practitioner networks and providing modest resources for new ESD-related projects. State and local agencies, where they have played a positive role in the development of ESD, have usually done so by releasing school- and district-level leaders from administrative constraints. A small number of states (Vermont and Washington in particular) have recently taken a more proactive role by adopting curriculum and teacher education standards that are directly relevant to ESD. Non-governmental organizations (NGOs) have exerted the most direct influence on American ESD. NGOs have created, refined and implemented ESD curricula, disseminated academic standards and facilitated the adoption of ESD practices in districts, schools and classrooms.

These three institutional influences on ESD are tightly intertwined. NGOs often receive funding from federal environmental agencies. Conversely, NGO leaders often sit on the advisory boards that direct and evaluate those agencies. In each of the two states that were quickest to adopt ESD-related standards, an NGO played a crucial role in both framing the standards and shepherding them through the legislative process.

The growth of ESD is most strongly in evidence at the level of individual schools and classrooms where dedicated practitioners have adopted, adapted or created ESD programs that suit their local conditions and conform to local political pressures. It is challenging to evaluate the scope or effectiveness of such diverse efforts in the best of circumstances. Even cataloguing ESD projects at the grassroots level presents considerable difficulties. No resources have yet been devoted to that task, and no such comprehensive evaluation has taken place. Unlike countries such as the UK (Huckle, 2009) and Germany (Rode and Michelsen, 2008), no system of ESD indicators is in place or under consideration for the United States.

Part 2. The Conception of Education for Sustainable Development in the United States

Layers of ESD governance

As noted above, there is currently no *legislated* national definition of ESD, and no formal agenda for pursuing it. Nonetheless, it is worth considering three distinct influences on the conception and practice of ESD in the United States:

- (1) The federal government, including both the persistent influence of past sustainable development projects from the 1990s and the contemporary influence of federal environmental regulatory agencies, particularly the Environmental Protection Agency (EPA);
- (2) State governments, particularly educational regulatory agencies at the state level;
- (3) Non-Governmental Organizations (NGOs), including not-for-profit educational organizations, advocacy groups, and professional associations of educators and researchers.

These three influences each contribute a layer to what Elizabeth Bomberg calls *sustainable development governance*:

Governance refers here to established patterns of rules and norms steering a polity in a stipulated direction. It implies the incorporation of principles, practices and mechanisms which enable a community to be governed even without a government or ruler. It may well include declarations, laws and policies mandated by government or from 'the centre', but it is much broader, including soft law, non-regulatory tools and policy learning. (Bomberg, 2009).

This section describes each of the three layers of ESD governance in turn, examining how ESD is conceptualized by the federal government, state governments, and NGOs, and how it relates to broader notions of sustainable development at each level.

ESD and Sustainable Development at the federal level

SD and ESD in the Clinton era: Sustainability through good citizenship

Although the United States does not currently have a government-sanctioned agenda for either ESD or sustainable development more generally, it *did* have such an agenda ten years ago. The United States was one of about 70 countries to convene a national council for sustainable development in response to *Agenda 21*, the action plan that resulted from the earth conference in Rio. This council, called the President's Council on Sustainable Development (PCSD), had no legislative authority but included prominent representatives from government, industry and non-profit organizations (NGOs). Maurer (1999a) offers a detailed account of the successes and struggles of the PCSD. As Maurer observes, the PCSD was notably successful in establishing a national vision and strategy for sustainable development despite initial tensions between different interest groups (Maurer 1999a, 1999b). This vision and strategy were published in 1996 under the title *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future* (PCSD, 1996). Unfortunately, the work of the PCSD had little influence on the legislative process. The PCSD itself was poorly integrated into national policy-making bodies, and progress of sustainability-related legislation was extremely limited due to competing legislative priorities and partisan conflict between the executive and legislative branches of government.

The PCSD was disbanded in 1999, after producing a second report that focused more narrowly on climate change, environmental management, and community policy. It was, by most accounts, a casualty of declining political will, but may also have suffered from the sense that its agenda-setting mission was complete and its consensus-based structure was less well suited for pursuing concrete sustainability goals. The PCSD was not replaced in the eight years of the George W. Bush presidency, and its decade-old recommendations remain, in many respects, the high-water mark of federal sustainability policy. The PCSD's recommendations are echoed in more recent documents (cf. Dembach, 2009) and continue to exert an influence on local actors. Furthermore, some of the local and regional partnerships established through the community outreach work of the PCSD persist to this day. For example, the Center on Sustainable Communities,² a project of the National Association of Counties, organizes a national network of local actors who pursue county-level sustainability policies (PCSD, 1999). The impact of the PCSD should be assessed relative to the contributions it sought to provide: a platform for timely but contentious discussions, an incubator for new policy ideas (to be pursued in other venues), a source of legitimacy and intellectual support for local efforts, and a symbol of national commitment to sustainable development (PCSD, 1999)

The PCSD's view of sustainable development

The PCSD articulated a nuanced idea of sustainable development that is both similar to and distinct from that presented in the Brundtland³ report (World Commission on Environment and Development, 1987) and other influential international policy documents. At the highest thematic level, the PCSD's idea of sustainable development contains the same two themes that are central to the Brundtland report: intergenerational equity and the "triple bottom line" of environment, economy, and social equity. These themes are clearly visible in the PCSD's vision statement:

Our vision is of a life-sustaining Earth. We are committed to the achievement of a dignified, peaceful, and equitable existence. A sustainable United States will have a growing economy that provides equitable opportunities for satisfying livelihoods and a safe, healthy, high quality of life for current and future generations. Our nation will protect its environment, its natural resource base, and the functions and viability of natural systems on which all life depends. (PCSD, 1999, p. iv)

An examination of the PCSD's operating principles reveals a somewhat different ideological emphasis, however. In their 1996 and 1999 reports, the members of the PCSD articulated sixteen shared "beliefs that underlie all of our agreements." These beliefs reveal the PCSD's orientation toward technological and global market mechanisms as the means by which a more sustainable future will be achieved. For example, the PCSD placed great emphasis on "market incentives and the power of consumers [that] can lead to significant improvements in environmental performance at less cost." (PCSD, 1999, p. v). Orr (1992) referred to this orientation as *technological sustainability*: a belief that the core problems of sustainable development can be addressed through increased efficiency and technological innovation without the need for a shift in the fundamental values that drive production and consumption.

² This organization is the current incarnation of an earlier collaborative project with the U.S. Conference of Mayors, known as the Joint Center on Sustainable Communities.

³ Formally titled *Our Common Future: Report of the World Commission on Environment and Development*, this report is more widely known by the last name of the woman who chaired the committee - Gro Harlem Brundtland.

The PCSD did address values and principles, but it did so primarily from a “good citizenship” perspective that emphasized personal responsibility, thoughtful decision-making and collaboration built on mutual compromise. The core message, which can be read as either conservative or pragmatic depending on the reader’s political orientation, is that sustainability can be achieved by doing a better job of the things that we are *already* doing, and doing more of the things we know we *should* be doing. In the Council’s own words:

The Council’s recent experience reaffirms our view that collaboration, stewardship, and individual responsibility are cornerstones of the path to a more sustainable America. By bringing diverse interests together, we can build the durable coalitions of common beliefs and values needed for a better future. By following the “intuitive and essentially moral commitment Americans have to preserving Earth’s beauty and productivity for future generations,” we can create a stewardship ethic as our guide. If we “make choices on the basis of a broader, longer view of self-interest... get involved in turning those choices into action; and... be held accountable for [our] actions,” we can foster individual responsibility. By working together, we can achieve economic growth, environmental protection, and social justice for ourselves and our children. (PCSD, 1999, p. 8; quotes are drawn from PCSD, 1996)

Another way in which the work of the PCSD both resonated with and departed from the work of international policy-making bodies was its emphasis on community and collaboration. The work of the council was an impressive embodiment of the principles of collaboration and community-based decision-making. Maurer (1999a) singles out the PCSD for its unusually successful integration of multiple stakeholder perspectives, the fruits of which can be seen in the persistence of local and regional sustainability projects that were started or facilitated by the PCSD and its members. Fittingly, the last major initiative of the PCSD before it was dissolved in 1999 was an event called the National Town Meeting for Sustainable Development.

During its existence, the PCSD embodied communitarian and collaborative principles more strongly than many other national councils, such as the UK Round Table for Sustainability and the Finland National Council for Sustainable Development, both of which adopted a more centralized and government-oriented approach to sustainable development. If these latter groups were ultimately more effective in enacting legislative and regulatory change, it is probably because bottom-up, community driven reform is predictably slower and less certain than centralized policy strategies. This tension between community-level democracy and efficient legislative action is a fundamental challenge for sustainable development policy in the USA and worldwide.

ESD in the era of the PCSD: Emergence of an influential paradigm

The PCSD consistently used the phrase *education for sustainability* instead of “education for sustainable development.” The former phrase continues to be more common and more enthusiastically embraced in American educational discourse. Practitioners and researchers who favor “education for sustainability” argue that it carries less of the ideological baggage associated with the word “development,” including fewer intimations of neo-liberal economic policy and ever-expanding regimes of production and consumption. They contend that development, as traditionally conceptualized, is not sustainable.

The PCSD saw education as part of a larger system defined in terms of information—specifically, the production, management, dissemination, and use of information relevant to sustainable development. Within this system, the role of education was to “give people the tools, skills, and experience they need to understand, process, and use information about sustainable development” (PCSD, 1996). Throughout the reports produced by the PCSD, the word education was used both broadly, to refer to formal and non-formal educational mechanisms, and narrowly, to refer

specifically to formal schooling. The Council maintained its information-centric view throughout, framing educational inequities in terms of “access to information” and “the skills and training necessary to make use of it” (PCSD, 1996).

Curiously, the PCSD explicitly connected the importance of education to market-based mechanisms for promoting sustainability:

Widely available information will become increasingly important as the United States moves to a new framework that places greater responsibility on individuals and the private sector to work cooperatively in making decisions that promote a balance among economic, environmental, and social issues. Informed decisions will create a more market-based regulatory framework--one that is more effective and flexible and less intrusive than the present system. (PCSD, 1996)

This argument, which reflects the powerful influence of economics on US environmental policy, has a strong internal logic: markets function more efficiently when all participants have access to accurate information. Still, it is unusual to find ESD discussed as a necessary counterpart to market-based mechanisms.

Within the overarching ideological framework described above, the PCSD identified two ways in which education was relevant to sustainable development. First, education serves as a minimum background condition for sustainability, meaning that sustainable development cannot be achieved without a minimum level of general education. Second, education can be a tool for pursuing sustainability, in the sense that education beyond a minimum level can be used more directly to promote sustainability. This dual relevance is captured, albeit in a more subtle form, in one of the PCSD’s ten overarching goals: “[to] ensure that all Americans have equal access to education and lifelong learning opportunities that will prepare them for meaningful work, a high quality of life, and an understanding of the concepts involved in sustainable development.” (PCSD, 1999). This perspective on ESD persists in the work of McKeown (2006) and others.

The PCSD further articulated the idea education for sustainability by stating a central ideal and a list of principles intended to guide more concrete projects.

Education for sustainability is the continual refinement of the knowledge and skills that lead to an informed citizenry that is committed to responsible individual and collaborative actions that will result in an ecologically sound, economically prosperous, and equitable society for present and future generations. The principles underlying education for sustainability include, but are not limited to, strong core academics, understanding the relationships between disciplines, systems thinking, lifelong learning, hands-on experiential learning, community-based learning, technology, partnerships, family involvement, and personal responsibility. (PCSD, 1996)

Such a sweeping form of education for sustainability could not possibly be *added* to the American educational system; it would have to be *infused throughout* that system. Arguing that “education for sustainability is about connections,” the Council recommended a vague but ambitious program of connections (1) among academic disciplines; (2) across school, community and non-formal learning contexts; (3) throughout the lifespan; and (4) across professional, civil and industrial organizations (ibid.). This last point is most unusual in discussions of ESD, but it reflects the PCSD’s position that private industry should be integral to all sustainable development initiatives.

Education for Sustainability – an (advisory) agenda from 1996

Although the PCSD included education as a significant component of its strategy for sustainable development in the United States, its recommendations were too broad to constitute a national strategy for ESD. In October of 1994, the PCSD collaborated with the National Science and

Technology Council (NSTC), a cross-departmental government agency that plans and supervises funding for research, to sponsor a National Forum on Partnerships Supporting Education about the Environment “to broaden our concept of education to include sustainable development” (PCSD, 1996b). The hundred-plus participants in this forum were drawn from “business and government, the educational community, and nongovernmental organizations (NGOs),” and included many practitioners of formal and non-formal environmental education (ibid.). Although the forum was formally independent of the PCSD, it was substantively connected to the Council through individuals who participated in both. In particular, one of the co-chairs of the National Forum was Madeleine Kunin, Deputy Secretary of the U.S. Department of Education, who also chaired the PCSD sub-committee that produced the council’s recommendations about education.

The forum itself did not produce a national strategy for ESD. Instead, it initiated a consensus-building process that resulted in the report *Education for Sustainability: An Agenda for Action*, released in 1996 as an accompaniment to the main PCSD report from that year. The definition of education for sustainability contained in this document closely resembles the definition in *Sustainable America*:

Education for sustainability is a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, and commitment to engage in responsible individual and cooperative actions. These actions will help ensure an environmentally sound and economically prosperous future. (PCSD, 1996b)

Education for Sustainability also offered a list of guiding principles that was similar though not identical those presented in *Sustainable America*:

...successful efforts for implementing education for sustainability depend on six core themes. Collectively, these themes outline a course of action to educate for sustainability. They are (1) lifelong learning, (2) interdisciplinary approaches, (3) systems thinking, (4) partnerships, (5) multicultural perspectives, and (6) empowerment.

Comparing this list with the PCSD’s list of principles (presented above) reveals the addition of “multicultural perspectives,” the omission of “technology,” and a shift in language from “personal responsibility” to “empowerment.” On the whole, however, *Education for Sustainability* reiterated the conceptual foundations of the *Sustainable America* report, using them as a foundation for a detailed program of policy initiatives nested within broader action areas and overarching policy recommendations. The recommendations, action areas and policy initiatives from *Education for Sustainability* are reproduced in **table I**, below and on the following pages. This list of initiatives, though lengthy, is of considerable interest because it reveals the ambitious scope of the report, as well as the degree to which many if not all contemporary ESD initiatives in the United States were outlined in this thirteen-year-old document.

Core Themes of Education for Sustainability: An Agenda for Action

1. Lifelong learning: The potential for learning about sustainability throughout one's life exists both within formal and nonformal educational settings.
2. Interdisciplinary approaches: Education for sustainability provides a unique theme to integrate content and issues across disciplines and curricula.
3. Systems thinking: Learning about sustainability offers an opportunity to develop and exercise integrated systems approaches.
4. Partnerships: Partnerships forged between educational institutions and the broader community are key to advancing education for sustainability.
5. Multicultural perspectives: Achieving sustainability is dependent upon an understanding of diverse cultural perspectives and approaches to problem solving.
6. Empowerment: Lifelong learning, interdisciplinary approaches, systems thinking, partnerships, and multicultural perspectives empower individuals and institutions to contribute to sustainability.

I. Formal Education

Ensure that the interconnections between the environment, economy, and social structures become an integral part of formal education, starting with kindergarten and continuing through elementary and secondary school and on through training at the college, university, and professional levels.

Action 1: Green Schools

Design and support opportunities for integrating the concepts and principles of education for sustainability into formal educational programs from early grade school through the university level.

INITIATIVE 1.1 - State boards of education should be encouraged to consider the importance of education for sustainability and to include it in licensure, standards, and guidelines for program approval developed at the state level for K-12 teachers and principals.

INITIATIVE 1.2 - Implement partnerships to help institutions of higher education achieve the transition to education for sustainability.

INITIATIVE 1.3 - Support exemplary models of "green campuses," that is, operational practices that engage the learning community in planning and decision-making for achieving sustainable educational environments.

Action 2: Professional Development

Encourage the incorporation of education for sustainability in pre-service and in-service professional development activities.

INITIATIVE 2.1 - Leadership by federal and state governments, institutions of higher education, professional societies, and the private and nonprofit sectors is needed in support of pre-service professional development in education for sustainability.

INITIATIVE 2.2 - Cooperative efforts and partnerships are necessary to insure that all in-service teachers receive training and support in classroom applications of a range of education materials addressing the concept of sustainability.

Action 3: Essential Learnings

Identify and formalize a set of essential skills and knowledge for all students that reflect a basic understanding of the interrelationships among environmental, economic, and social equity issues.

INITIATIVE 3.1 - The North American Association for Environmental Education and its partners are following a critique-and-consensus process for development of learning standards in environmental education that are consistent with the recommendations of the National Education Goals Panel.

INITIATIVE 3.2 - Create a focus group which is representative of formal and nonformal educators, including those who teach adults as well as youth, to develop and continually evaluate indicators of essential learnings for sustainability.

II. Nonformal Education

Expand public access to opportunities to learn about sustainability issues as they relate to the private, work, and community lives of individuals.

Action 4: Public Awareness

Support a campaign to raise public awareness of sustainability, convey information on indicators of sustainable development, and encourage individuals to adopt sustainable practices in their daily lives.

INITIATIVE 4.1 - Foster increased public awareness of sustainability through a public awareness program.

INITIATIVE 4.2 - Support a system of regularly updated, comprehensible national benchmarks of progress toward the goals of sustainability.

INITIATIVE 4.3 - Entertainment media may consider designing a coordinated media campaign to raise youngsters' awareness of sustainability.

INITIATIVE 4.4 - Support the continued outreach to American journalists on issues related to sustainability.

INITIATIVE 4.5 - Establish incentive programs, such as national awards, to recognize successful partnerships within the business community that support educational efforts on sustainability.

Action 5: Sustainable Development Extension Network

Establish an extension network to enhance the capacity of individuals, workforces, and communities to live sustainably.

INITIATIVE 5.1 - Establish a national Sustainable Development Extension Network (SUDENET) to foster access to information, technical expertise, and collaborative strategies that result in action taken by local communities.

Action 6: Community Visioning and Assessment

Encourage partnerships and activities that support community visioning and assessment activities.

INITIATIVE 6.1 - Create a national program in partnership with organizations that may include the National Council of Mayors, the National Governors' Association, and the National Association of Counties, that will provide educational resources and leadership training in support of community visioning and assessment.

Action 7: Workforce Development

Infuse sustainability concepts and practices into development of the U.S. workforce.

INITIATIVE 7.1 - Disseminate effective school-to-work models that emphasize issues of sustainability while encouraging dialogue with the business sector to address sustainability through hiring and recruitment practices.

INITIATIVE 7.2 - Strengthen the partnership between the U.S. Department of Labor and the American Association of Community Colleges to support education for sustainability.

INITIATIVE 7.3 - Use the U.S. Department of Labor's Training Technology Resource Center as the dissemination vehicle for workforce development information on programs, research, and organizations in the area of education for sustainability.

INITIATIVE 7.4 - Examine the feasibility within the Department of Labor's Occupational Information Network (O*NET) of collecting and disseminating information on emerging occupations in energy efficiency and waste reduction.

Action 8: Lifelong Learning

Encourage lifelong learning about sustainability at the individual, household, and community levels.

INITIATIVE 8.1 - Develop community college courses and programs aimed at producing the skills and information needed for contributing to sustainable activities at work and during leisure activities.

III. Cross-Cutting Themes

Institute policy changes at the federal, state, and local levels to encourage education for sustainability; develop, use, and expand access to information technologies in all educational settings; and encourage understanding about how local issues fit into state, national, and international contexts.

Action 9: State and Federal Policy Changes

Initiate strategic state and federal policy changes, including establishing necessary partnerships, as the foundation for a coordinated strategy for education for sustainability.

INITIATIVE 9.1 - Establish a working group within the National Science and Technology Council to devise and coordinate the implementation of broad federal policies for education for sustainability, ensuring an integrated set of federal programs directed to high priority national needs.

INITIATIVE 9.2 - Explore ways to coordinate resources, make education for sustainability more central to agency missions, and increase funding of education for sustainability programs and research.

INITIATIVE 9.3 - Develop consortia to coordinate, both among states and at the federal level, the infusion of education for sustainability into formal and nonformal educational institutions.

Action 10: Technology and Information

Coordinate or enhance existing essential tools for formal and nonformal environmental and sustainable development education, including multimedia computer and telecommunications technologies and an information clearinghouse.

INITIATIVE 10.1 - Enhance existing interactive information and communications networks designed to facilitate the exchange of information on education for sustainability through the Internet, linking educators, students, and policymakers globally.

INITIATIVE 10.2 - Develop, regularly update, and disseminate a videotape or CD-ROM that features the current year's highlights related to successful efforts in education for sustainability, such as partnerships, leaders who have played important roles, curriculum materials, and other information resources.

INITIATIVE 10.3 - Support coordination of existing clearinghouses to offer collaboratively a primary point of contact for incorporating and disseminating the vast array of information resources on education for sustainability available through print and electronic media.

INITIATIVE 10.4 - Make greater use of geographic information systems and other databases related to the environment and sustainability in educational curricula.

Action 11: Multicultural Perspectives

Emphasize and reflect multicultural perspectives at all levels of formal and nonformal education.

INITIATIVE 11.1 - Increase professional development among teachers who are incorporating education for sustainability in urban and rural settings that are characterized by diverse cultural groups.

INITIATIVE 11.2 - Support efforts to introduce all educators and students to the issues and perspectives of the environmental justice movement.

Action 12: Global Perspectives

Continue to expand international linkages for environmental education and education for sustainability.

INITIATIVE 12.1 - Educate for global sustainability by: (1) introducing all students to issues raised at the Stockholm and Tbilisi

conferences, and by the Brundtland Report and Agenda 21 of the United Nations Conference on Environment and Development (UNCED); (2) sharing sustainability approaches used by other nations, both their successes and challenges, through distance learning and other forms of communication; and (3) exposing students to the responsibilities shared by industrialized and developing countries for providing solutions to environmental, economic and social challenges.

INITIATIVE 12.2 - Support the convening of an international congress on education for sustainability to take place early in the next decade as a catalyst for strategic planning for the remainder of the 21st century.

INITIATIVE 12.3 - Participate in global partnerships on education for sustainability that build on the progress since the 1972 Stockholm Conference, while being tailored to reach generations of the 21st century.

Table I. Summary of themes, recommendations, actions and initiatives from *Education for Sustainability* (PCSD 1996b)

Like the reports of the PCSD, *Education for Sustainability* was an advisory document, with no immediate legislative or regulatory implications. Although the authors appealed for changes in state and national policy, they envisioned a broader audience for their work, and were openly suspicious of the limits of central authority to realize change:

Educational change cannot follow purely from mandates, whether state or federal, although such efforts can be effective as catalysts. Instead, change will emerge from grassroots initiatives, as the history of environmental education clearly demonstrates.

Accordingly, the policy initiatives in *Education for Sustainability* referred to numerous institutions and groups, including institutions of higher education, media outlets, and nation-wide professional networks in addition to state and federal policy-makers. Initiatives such as the selection of content standards (“essential skills and knowledge”), which would be within the purview of government in other nations, were portrayed by the PCSD as tasks for NGOs and community partnerships. This reflects the realities of the decentralized American education system, but it also reveals an ideological commitment to the local or *contextual* nature of sustainability. Although the authors of *Education for Sustainability* began with a set of core principles, they also argued that the principles should evolve over time, and that sustainability itself would mean different things to different people:

Furthermore, educational programs should be rooted in the actual experiences of people in their own communities. These programs should not assume a common understanding of sustainability’s political and social context.

This idea—that *sustainability* itself is a variable construct— goes one step beyond the more widely accepted notion that sustainable development should be rooted in community context. It also poses serious questions about the national government’s role in promoting ESD. In *Education for Sustainability*, that role was limited to providing funds, coordinating collaboration and facilitating the exchange of information:

Grassroots activities will continue to drive progress through the bottom-up approach that has characterized the field to date. Government can assist, however, by continuing and improving its coordinating role, and funding innovation and research.

Although limited in scope, the role of government was also seen as essential to the growth of community-derived ESD projects. In light of what actually happened in the twelve years following the publication of *Education for Sustainability*, the following synopsis of government’s role in promoting ESD seems prophetic:

While there are many successful education efforts underway across the federal government, there is an opportunity for officials to address the lack of effective coordination among the educational activities of individual agencies. Duplication of efforts among agencies as well as a steady decline in fiscal support limit efforts to advance education for sustainability.

Indeed, the years since *Education for Sustainability* have provided an extended test of that report's faith in the viability of grassroots mechanisms. Some of the policy initiatives have been carried to completion and are beginning to exert an impact on educational practice today. Notable among these is the standards project of the North American Association for Environmental Education (see **initiative 3.1**). The scope of this project, and its relationship to ESD, are discussed in more detail below. Other policy initiatives met with short-term success, but have since suffered setbacks. A key example here is the withdrawal of the U.S. Conference of Mayors from the Joint Center for Sustainable Communities (see **initiative 6.1**). Still other policy initiatives, including most of the initiatives that required action at the federal level, were never begun. In balance, though *Education for Sustainability* has fallen from view in recent years, its recommendations are still wholly relevant to ESD in the United States today.

Other federal support for ESD, past and present

In response to the PCSD's educational agenda, the Clinton administration established an Office of Education for Sustainability in the US Department of Education in 1996. The office was closed two years later due to lack of funding and the absence of a clear mandate. Before and after that two-year interval, ESD-related efforts at the federal level have been sponsored by a patchwork of agencies with little coordination and no central conceptual framework.

The closest thing to a comprehensive inventory of the federal involvement in ESD was the EPA's systematic survey of federal agencies that support environmental education,⁴ conducted in 2002. The EPA found EE programs in fourteen different agencies, including agencies in the Departments of Agriculture, Commerce, Energy, Education, Transportation and the Interior, as well as the National Aeronautics and Space Administration and the National Science Foundation. The authors of the EPA survey observed that these programs typically had an *ad hoc* quality:

...EE is frequently a by-product or inherent aspect to a program or activity with a broader goal. For example, most of the activities and programs listed are not specifically for EE, but rather include it as one activity that might be included. (EPA 2002, p. 2)

The U.S. Department of Education has been minimally and indirectly involved in EE, mostly through its ongoing investment in science and mathematics education. EE initiatives in other agencies have typically focused on environmental conservation (e.g., the educational projects of the National Park Service) or environmental science (e.g., the extensive curriculum materials produced by the National Aeronautics and Space Agency). Two notable exceptions can be found in the Departments of Energy and Agriculture, both of which sponsor educational programs that emphasize the balance between environmental and economic concerns. The Department of Agriculture is one of the few federal agencies to maintain the language of sustainability, most obviously in the Sustainable Agriculture Research and Education program. This program, which works to "advance farming systems that are profitable, environmentally sound and good for communities through a nationwide research and education grants program" (SARE, 2009), devotes most of its attention to adult and non-formal education, and provides few resources primary and secondary education.

⁴ In this case, EE is a reasonably good proxy for ESD because all comprehensive ESD programs would have ostensibly included an EE component.

The main federal sponsor of EE has been the EPA itself. Since the passage of the second National Environmental Education Act in 1990, the EPA has included a Division of Environmental Education, whose mission is to

Ensure that environmental education, based on sound science and effective education practices, is used as a tool to promote and protect human health and the environment and to encourage student academic achievement. (EPA, 2008)

The location of the Division of Environmental Education within the EPA, rather than the Department of Education, reflects the emphasis of the 1990 act, which conceptualized EE as a supplement to K-12⁵ education, rather than an integral component. The first National Environmental Education Act, passed in 1970, attempted to integrate environmentally-relevant content into primary and secondary education. It was poorly funded and poorly received among school administrators, and was discontinued in 1975.

The EPA serves a capacity-building role with respect to EE. It does not attempt to regulate the implementation of EE, and disburses the bulk of its funds to local, state and regional authorities as grants to support EE research and practice. The EPA's Division of Environmental Education also seeks to add coherence to the broad range of educational projects conducted by other federal agencies. The 2002 survey of EE activities in other federal agencies is part of this effort. The EPA is legally responsible for "effective coordination of programs related to environmental education, including environmental education programs relating to national parks, national forests, and wildlife refuges" (EPA, <http://www.epa.gov/enviroed/iag.html>).

Since its first funding cycle in 1992, the Environmental Education Division has disbursed about thirty million dollars in EE funding (EPA, 2009). Although this is a small amount relative to the scope of total federal expenditures on education, the EPA has consistently required their grant recipients to find other matching funds and encouraged the dissemination of best practices and research findings through professional networks. The end-result of this funding strategy has been a tightly networked EE community that is increasingly capable of sharing information while remaining locally relevant.

What is the relationship between ESD and the EE activities of the EPA? The EPA's definition of EE focuses on "public awareness and knowledge about environmental issues or problems," and notes that "a primary desired outcome of environmental education programs is environmental literacy" (EPA, 2008). This definition, as well as other EPA materials on EE (see **table 2**), lacks any explicit mention of economic development or social equity—hallmarks of ESD at both the national and international level. In general, the EPA places a strong, programmatic emphasis on the "environment" component of ESD's triple bottom line. Although some recipients of EPA grants have focused on economic development or on health outcomes that are crucial to social wellbeing, the sole unifying feature of the EPA's educational activities is a concern for "environmental quality" (NEEAC, 2005).

Environmental education increases public awareness and knowledge about environmental issues or problems. In doing so, it provides the public with the necessary skills to make informed decisions and take responsible action.

A primary desired outcome of environmental education programs is environmental literacy. Through the many programs funded and led by EPA, people of all ages and backgrounds are being provided multiple experiences that foster development of the combination of knowledge, skills, and attitudes required to be environmentally literate.

⁵ K-12 is an abbreviation for "kindergarten through twelfth grade," encompassing both primary and secondary education.

Because environmental education is a process, it cannot in itself improve the environment, such as by enhancing local air or water quality. Instead, environmental education provides the capability and skills over time to analyze environmental issues, engage in problem solving, and take action to sustain and improve the environment. As a result, individuals are more capable of weighing various sides of an environmental issue to make informed and responsible decisions.

The components of environmental education are:

- Awareness and sensitivity to the environment and environmental challenges
- Knowledge and understanding of the environment and environmental challenges
- Attitudes of concern for the environment and motivation to improve or maintain environmental quality
- Skills to identify and help resolve environmental challenges
- Participation in activities that lead to the resolution of environmental challenges

Environmental education does not advocate a particular viewpoint or course of action. Rather, environmental education teaches individuals how to weigh various sides of an issue through critical thinking and it enhances their own problem-solving and decision-making skills.

<http://www.epa.gov/enviroed/basic.html> (accessed 23 April, 2009)

Table 2. EPA statement on the purposes of Environmental Education

This may be changing. Working documents of the National Environmental Education Advisory Council (NEEAC), which advises the EPA's on EE, suggest that a broader idea of sustainability is establishing a foothold in the EPA's work. For example, the working title of the forthcoming NEEAC report, at the time of writing, *Stewardship and Sustainability: The Role of Environmental Education* (<http://epaneeac.blogspot.com/>, accessed 4/23/09). It remains to be seen whether or not this reflects a more wholesale adoption of the idea of sustainability, as conceived in international documents or in *Education for Sustainability: An Agenda for Action*.

Intimations of the future federal role in ESD governance

As described above, the U.S. federal government does not currently have a formal agenda for ESD, but exerts an influence on ESD through the uncoordinated actions of many different agencies. The new administration of President Barack Obama is unlikely to drastically alter the American ESD landscape in part because of the constitutional limits on federal authority over education and in part because ESD, *per se*, has not yet emerged as a major issue for the new administration. Although it is too soon to predict the long-term impact of the Obama administration on American ESD, there are some early indications of the role that the federal government will and will not play in the next four years. These indications suggest that (1) ESD will continue to lack a formal place in the Department of Education's national strategy, but also that (2) ESD *will* have a small but secure place in the sustainability initiatives of other departments.

Neither education nor sustainability was a central issue in the presidential election of 2008, which was dominated by debates about economics and national defense. Since the election, the evolving economic crisis has pushed education even lower down the list of priorities: at the time of writing, the new president had only given one major speech on the topic. Sustainability has fared somewhat better. Although the phrase "sustainable development" almost never appears in the administration's official statements, President Obama is pursuing twin policy initiatives focused on "green jobs" and "sustainable energy." The details remain to be hammered out by legislators, but both initiatives emphasize the linkage between economic prosperity and environmental wellbeing. More promising still, the administration has just announced an energy education initiative under the title RE-ENERGYSE (REgaining our ENERGY Science and Engineering Edge). This initiative, funded through the Department of Energy and the National Science Foundation, is clearly relevant to ESD.

Before discussing RE-ENERGYSE, it is worth examining the Obama administration's nascent education agenda, as this agenda will determine the context in which ESD-related projects unfold. In a speech to the Hispanic Chamber of Commerce on March 10, 2009, the President outlined his priorities for education reform in the coming years (Obama, 2009). This speech contained no reference to sustainability, but nonetheless has two significant implications for ESD. First, President Obama emphasized the familiar themes of standards and accountability, indicating that the current regime of standards-based, assessment-driven reform will either continue or intensify.

...I'm calling on states that are setting their standards far below where they ought to be to stop low-balling expectations for our kids. The solution to low test scores is not lowering standards -- it's tougher, clearer standards... (Obama, 2009)

As described in the first section of this report above, standards-based reform creates a hostile climate for ESD programs that operate at or beyond the margins of the core academic areas. If states do institute "tougher, clearer standards" (Obama, 2009) in response to federal pressure, it will become more and more difficult to run such programs. Under these conditions, ESD will be only survive in formal schooling if (1) it can be justified as a strategy for improving outcomes in traditional academic disciplines or (2) it is integrated into state or local standards, as is happening in a small number of states.

American ESD advocates are often quick to argue that ESD requires institutional and pedagogical change as much as curricular change. From this perspective, the Obama administration's commitment to "charter schools" offers some cause for optimism.

One of the places where much of that innovation occurs is in our most effective charter schools. And these are public schools founded by parents, teachers, and civic or community organizations with broad leeway to innovate... I call on states to reform their charter rules, and lift caps on the number of allowable charter schools, wherever such caps are in place. (ibid.)

Charter schools, which are primarily an American phenomenon, are publicly financed schools that operate under special charter from state or local authorities. In exchange for a commitment to meet certain academic goals, they are granted greater operational flexibility. Many charter schools around the United States have sought to increase instructional coherence by adopting a central theme, and a small but growing number have chosen environment- or sustainability-related themes. Indeed, both the "green schools" and "sustainable schools" movements, discussed later in this report, have taken root and grown through the participation of charter schools.

Other features of the national education agenda, as outlined in this speech, have uncertain implications for ESD. The President's focus on science and mathematics education, for example, promises to strengthen the disciplinary contexts in which ESD topics are, at present, most frequently addressed. On the other hand, a narrowing of science standards could negate this advantage by increasing the emphasis on canonical science principles at the expense of socio-scientific issues. Likewise, the President's commitment to career and technical education, in the context of his demonstrated interest in developing a "green economy," could foreshadow a new burst of ESD-related projects at the post-secondary level. This would require significant innovation at technical colleges and training schools around the country, however, and its concrete consequences will depend on specifics of the President's initiative that are not yet known.

Like the President's overall education agenda, the RE-ENERGYSE initiative awaits legislative action. RE-ENERGYSE is unlikely to be controversial, though, as it is situated within larger spending bills

that emphasize the sort of investment in research and technology that typically receives bipartisan support. The Obama Administration describes RE-ENERGYSE as:

A joint initiative by the Department of Energy and the National Science Foundation that will inspire tens of thousands of American students to pursue careers in science, engineering, and entrepreneurship related to clean energy – with programs and scholarships from grade school to graduate school. (The White House Office of the Press Secretary, 2009)

As this description indicates, RE-ENERGYSE is far from a holistic approach to sustainability. Instead, it focuses on involving young people in scientific and technological research and development, with the specific aim of expanding the “transition to a low carbon economy,” a transition that President Obama refers to as “the single most important challenge of their generation” (ibid.).

In many respects, the RE-ENERGYSE initiative reflects a characteristically American approach to sustainability—an approach that emphasizes technology and entrepreneurship, and assumes that solutions will arise through public-private collaborations and the incentive-driven choices of consumers. The other characteristic feature of past American sustainability projects, an emphasis on community and local decision-making, is absent. With respect to ESD, the RE-ENERGYSE initiative represents neither a new approach nor a particularly complete one—but it *does* represent a rare and concrete commitment to education with a broader federal initiative focused on sustainable development. No such program has been seen in the United States since the dissolution of the President’s Council on Sustainable Development in 1999.

A note about climate change education

By 1999, Climate Change was already a central focus for sustainable development projects in the United States. This is evident in the PCSD’s 1999 report, which featured climate change as one of four foci selected from a considerably larger list of topics in the Council’s 1996 report. Today, in many cases, climate change projects and climate change rhetoric have effectively supplanted sustainable development projects and rhetoric. This is true at national, state and local levels of governance. For example, after withdrawing from the Joint Center on Sustainable Communities in 2005, the U.S. Conference of Mayors launched the U.S. Conference of Mayors Climate Protection Center. On the webpage formerly dedicate to the Joint Center, the Conference of Mayors notes:

The Joint Center for Sustainable Communities is no longer in existence. However, The U.S. Conference of Mayors is still interested in promoting the issue of sustainable development. Please go to the Municipal Waste Management Association web site for more information.

The reduction of sustainability to a waste management concern is telling.

All this said, Climate Change Education (CCE) in the United States is in its infancy. Within research and practice on formal (K-12) education, CCE is interpreted as “education about the scientific understanding of global climate change,” and, as such, is the near-exclusive province of science educators and science education researchers. Very little research on CCE has been conducted in educational contexts. A search of the educational database ERIC revealed only a handful of empirical research articles.⁶ Most of these focused either on the use of debate and discussion as

⁶ Searching within the ERIC database for “climate change” or “global warming” produces 71 peer-reviewed articles. Most of these articles appeared in practitioner journals, rather than research-oriented publications, or did not concern American K-12 classrooms. The number of US-based research articles on climate change education, or even research articles mentioning climate change, was vanishingly small and appeared almost exclusively in journals of science education.

pedagogical strategies in science classrooms or on explicit instruction in the nature of science. In both cases, climate change served merely as a salient example of appropriate content. Although CCE will not be examined in detail in the remainder of this report, there is little doubt that it will play a sizable role in shaping the future of American ESD.

ESD and Sustainable Development at the state level

In the past decade, states have increasingly stepped in to fill policy gaps left by the federal government's inaction on sustainable development (Rabe, 2004). More recently, a few states have begun to do the same for ESD. Because state and local agencies have legal authority for education in ways that the federal government does not, their decisions will play a critical role in shaping the future of ESD practice in the United States. Because most states are still doing little to advance ESD, however, it is neither practical nor necessary to examine the policies of all fifty states. Instead, this section describes a few general features that characterize state-level ESD, then offers a slightly more detailed descriptions of ESD policy in two states (Vermont and Washington) that are addressing ESD in more formal and comprehensive ways. These examples are far from typical, but they represent important precedents that other states may emulate in the future. Local governance at the city or county level, though crucial to the implementation of ESD, is too complex a topic to be dealt with in any detail here.

The most obvious ESD-related work in many states takes place under the heading of environmental education. Almost all states support EE in some capacity, although the level of support varies widely, from the designation of a coordinator or contact person within an existing state agency (often but not always the agency in charge of education) to the establishment of independent administrative offices with considerable autonomy and some, albeit limited, financial resources. In its 2005 report, the National Environmental Education Advisory Council (NEEAC) published a figure outlining a hypothetical "comprehensive state-level EE program." No state currently has such a program, but the NEEAC figure (reproduced in **Figure I** below) reveals much about the degree to which states are perceived as responsible for the implementation of EE.

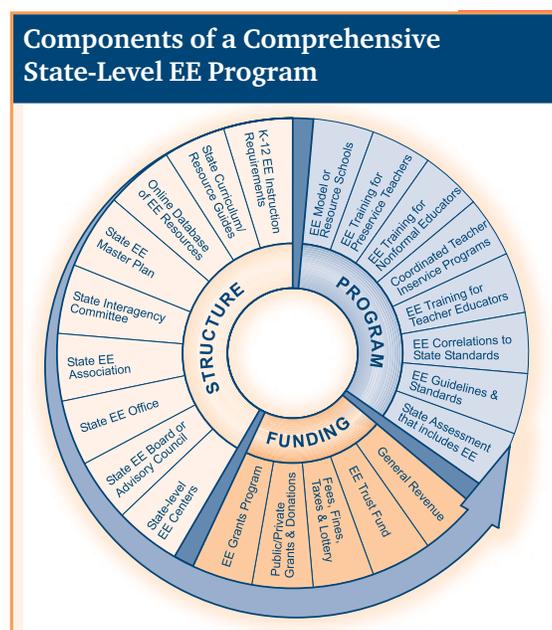


Figure I. a hypothetical representation of a comprehensive state EE program (NEEAC, 2005)

The most typical component of state-level EE/ESD governance is a network of practitioners, coordinated or supported by state officials to a greater or lesser extent. In this respect, state governments mimic the role of the federal agencies, such as the EPA, that attempt to enhance EE from the bottom up by strengthening practitioner networks and encouraging dissemination of effective practices. Some states, such as Minnesota, also emulate the EPA by offering block grants to support EE projects in schools and communities.

A small but increasing number of states have enacted laws or otherwise altered their primary and secondary education policies to include EE and ESD. This is typically done in three ways:

- **Establishing EE or ESD content standards as a way of influencing instruction.**⁷ Such standards specify either the material that should be taught or the outcomes that should be achieved. State standards can be advisory or mandatory. Progress toward meeting mandatory content standards is often, though not always, assessed through the use of standardized tests.
- **Establishing teacher education requirements that focus on EE or ESD.** Such requirements are now fairly common, but in most states they remain vague, leaving teacher education programs with substantial leeway in choosing how to meet them. As a result, the practical impact on teacher training can be disappointing (Mastrilli, 2005).
- **Providing flexibility through charter school legislature.** Forty states currently have active laws granting administrative flexibility to schools that obtain a special charter (Center for Education Reform, 2009). Although these laws do not specifically mention EE or ESD, charter schools in many states have used the additional flexibility to adopt practices relevant to sustainability, both in and out of the classroom.

States that are frequently cited as EE *innovators* include California, Massachusetts, Minnesota, Oregon, Vermont, Washington and Wisconsin. At the time of writing, only two⁸ of these states, Vermont and Washington, had integrated the language of sustainability into formal education policy. Both states reference internationally prominent ideas of ESD. It is worth discussing each of these cases in more detail.

Vermont

The state of Vermont, in the northeastern corner of the continental United States, has been a consistent innovator in American ESD policy and practice and was the first to adopt state standards that explicitly addressed sustainability. Vermont's standards originated through a grassroots process driven by educators who wished Vermont's educational standards to reflect their concern for sustainability. These educators, who worked in both formal and non-formal educational settings, convened a series of community meetings to articulate the meaning of sustainability with respect to Vermont. In 2000, the State Board of Education accepted the two resulting standards, which require primary and secondary schools to pursue the following outcomes:

Sustainability: Students make decisions that demonstrate understanding of natural and human communities, the ecological, economic, political, or social systems within them, and awareness of how their personal and

⁷ It is worth noting that *many* states include ESD-relevant disciplinary material, such as environmental science or economics, in content standards for traditional academic disciplines.

⁸ Oregon also uses the language and ideas of ESD in the *Sustainable Oregon Schools Initiative*. This program, though admirable, is voluntary, and the state has yet to adopt formal sustainability standards or similar education policies.

collective actions affect the sustainability of these interrelated systems.

Understanding Place: Students demonstrate understanding of the relationship between their local environment and community heritage and how each shapes their lives. (Vermont Department of Education, 2000)

Each standard is accompanied by more specific outcomes and practices intended for particular grade levels. These grade-level outcomes and practices are notable for their focus on practical action that is deeply integrated in local context. Thus, in grade 5-8, students must:

Identify and practice ways to repair, re-use, recycle (e.g., collect and redistribute leftover household paint), and design and implement a plan to monitor community resource consumption (e.g., survey community water, electric, and/or fuel use). (Vermont Department of Education, 2000)

The interlinked influence of federal, state and NGO influences on American ESD, part 1

The growth of education for sustainability in the State of Vermont is an excellent example of the way in which federal agencies, state agencies and NGOs combine to influence American ESD. Vermont was the first state to institute academic standards that directly address sustainability. It did so in on the recommendation of educational NGOs such as Shelburne Farms, which both mobilized popular opinion in favor of new standards and drafted standards for consideration by the state. Shelburne Farms, in turn, received funding from the federal government (through the Environmental Protection Agency) to develop curriculum materials and build local capacity for environmental education. In short: federal support empowered a non-governmental organization to propose policy changes, which were then implemented by the state.

In the years following adoption of the standards, a partnership was established among NGOs, government agencies, the University of Vermont to support teachers in implementing the standards. This partnership, called Vermont Education for Sustainability, provides tools, training and out-of-school enrichment resources that help K-12 educators meet the Sustainability and Understanding Place standards. It is also deeply involved in the recent, ongoing efforts to establish public schools that “use sustainability as an integrating context for curriculum, community partnerships, and campus practices” (<http://www.sustainableschoolsproject.org/about/>).

Washington

The state of Washington, in the northwestern corner of the continental United States, is developing a number of ESD-related policies and resources that, when complete, will represent the most comprehensive approach to ESD found in any state. Among the policies in development are content standards, teacher education standards, and curriculum projects that focus on integrating sustainability into particular areas of instruction. One recently completed course offers secondary students in career and technical education programs an introduction to green industries with a focus on green design and technology.⁹ Another curriculum project encourages teachers to teach sustainability concepts through design projects in core academic subject areas.¹⁰

In Washington State, both the forthcoming standards and existing curriculum projects use the language of “education for environment and sustainability,” or EES.¹¹ This language is a clear

⁹ <http://www.k12.wa.us/CareerTechEd/pathways/TechIndustry/curriculum.aspx>

¹⁰ <http://www.k12.wa.us/curriculumInstruct/EnvironmentSustainability/SustainableDesign.aspx>

¹¹ Official documentation in Washington State actually alternates between two phrases: “education for environment and sustainability” and “environmental and sustainability education.” This inconsistency appears to reflect the newness of the program rather than any ideological divide. For the sake of simplicity, I have chosen to use the first phrase only.

compromise between historical EE language and a newer explicit emphasis on sustainability. The terms in which the program is defined leave little doubt as to the influence of international ESD policy statements, as well as the Clinton-era PCSD:

The quality of life for all people, now and in the future, will ultimately depend upon the individual's comprehension of the interdependency of environmental, economic, and social systems, and of how individuals interpret their personal role in the total scheme of life... Education for Environment and Sustainability is one way to frame this integrated system of interdependency, as it takes into account environmental stewardship, economic viability, and social justice. The goal of EES is to develop capacity for society to meet the needs of today while assuring intergenerational equity – that is, to not limit the opportunity for optimal living in future generations. (Washington OSPI, 2009).

Washington's content and teacher education standards reflect the state's commitment to teaching EES content across the traditional disciplines rather than in stand-alone courses. Thus, the academic content standards consist of overarching EES standards that are connected to specific grade-level content standards *in the disciplines*. To ensure that teachers are capable of connecting disciplinary content to overarching EES principles, OSPI is creating guidelines and illustrative materials that demonstrate how disciplinary content can be taught in the context of sustainability. Washington's teacher education standards for EES reflect a similar commitment to EES as a cross-curricular theme. There are two relevant sets of standards. The first, already in place, mandates that *all* teachers "prepare [k-12] students to be responsible citizens for an environmentally sustainable, globally interconnected and diverse society" (Washington OSPI, 2009). The second, still under development at the time of writing, offers guidelines that *some* pre-service teachers will follow to obtain an EES certification in addition to their subject matter certification. Just as there are no EES content standards outside of the disciplines, it will not be possible for teachers in Washington to receive a license for EES *only*.

The role of Non-Governmental Organizations (NGOs)

NGOs have played a crucial role in advancing American ESD. In the absence of a national agenda, it is NGOs that have taken the lead in establishing guidelines for ESD practice, advocating for ESD policy at the state level and building capacity in schools and communities. Although many of these organizations have a national or international audience for their work, their impact can be seen most vividly in local projects:

- In Vermont, the non-profit educational organization Shelburne Farms was instrumental in organizing the community meetings that led to the adoption of Vermont's sustainability standards (VT-EFS, 2000). Since the adoption of the standards, Shelburne Farms has played a central role in the state's ESD capacity-building efforts, providing ESD-related trainings and resources to primary and secondary educators.
- In Washington State, the development of curriculum and teacher education standards in 2008-9 was influenced by the standards and principles created by a non-profit organization called the US Partnership for Education for Sustainable Development (Wheeler, 2009).
- In New York, the Putnam/North Westchester Board of Cooperative Educational Services hired a non-profit organization called The Cloud Institute for Sustainability Education to develop K-12 curriculum modules that are now used in dozens of schools.

Because these NGOs exert a powerful influence on ESD practice, it is worth examining how several of the most influential organizations define ESD.

Shelburne Farms

Shelburne Farms, which describes itself as “a membership-supported, nonprofit environmental education center” is housed in a working demonstration farm in Shelburne, Vermont (Shelburne Farms, 2003). Its onsite programs include experiential learning activities for students and professional development courses for educators, as well as agriculture- and sustainability-focused workshops for adults. An annual summer institute on Education for Sustainability brings together “educators from all disciplines and levels to delve into EFS topics, issues, and concepts, using the lens of sustainability to investigate local human and natural communities” (ibid.). Through partnerships with other Vermont organizations, including the University of Vermont and the state government, Shelburne Farms supports the development of resource materials for educators who wish to implement ESD. Although Shelburne Farms deliberately focuses the bulk of its attention on *local* sustainability and ESD projects, the summer institute and the resources developed by the staff of Shelburne Farms have reached a wider clientele.

A practitioner manual, entitled *The Vermont Guide to Education for Sustainability*, reveals how ESD is conceptualized by Shelburne Farms and its Vermont-based collaborators. Although the *Guide* explicitly refers to the Brundtland Report (World Commission on Environment and Development, 1987), its authors are careful to re-frame the idea of sustainability in terms of local values and traditions, thus:

When we say *sustainability*, we’re simply using a new term for a long-standing Vermont tradition: “Improving the quality of life for all within the capacity of the earth to provide that life for current and future generations” (VT-EFS, 2004, p. 4)

Within this broader conceptual context, education for sustainability is defined as follows:

The goals of sustainability are often referred to as environmental integrity, economic prosperity, and social equity. Education for Sustainability, or EFS, tries to bring these three goals of sustainability closer to reality. It promotes understanding the interconnectedness of environment, economy, and society. EFS links this knowledge with inquiry and action to help students build a healthy future for their communities and the planet. (ibid., p. 5)

The *Guide* describes, in considerable detail, the characteristic goals and practices that define education for sustainability. **Table 3** (following page) summarizes these goals and practices.

Taken as a whole, the idea of education for sustainability articulated by Shelburne Farms and its collaborators is quite similar to that outlined in the 1996 report *Education for Sustainability*, but includes a new and notable emphasis on *local* problems as well as a distinctly activist pedagogy called service learning. One characteristic approach that is central to the *Guide* but not included in Table 3 is the use of sustainability as an integrating theme across disciplines, ideally involving the entire school. This “schoolwide approach” is an emergent feature of ESD and, to some extent, EE in the United States, and is discussed in a later section.

Characteristic features of education for sustainability as outlined in <i>The Vermont Guide to Education for Sustainability</i> (VT-EFS, 2004)	
Education for Sustainability fosters:	Key elements
<ul style="list-style-type: none"> • The ability to integrate scientific, social, and economic thinking and knowledge; • Real-world skills applied toward responsible ends; • Appropriate applications of technology that help solve, not create, problems; • Equity, justice, inclusivity, and respect for all people; • A pedagogy that encourages creativity, vision, compassion, cooperation, and collaboration in every student and teacher. 	<ol style="list-style-type: none"> 1 Uses sustainability as an integrative concept. (i.e., overarching/essential question incorporates some aspect of the concepts, principles, issues, or skills/strategies of sustainability.) 2 Builds understanding of the meaning and/or principles of sustainability 3 Involves students in thinking about creating a sustainable future 4 Connects past, present and future perspectives, contexts and/or impacts 5 Prompts students to consider impacts of personal and communal decisions 6 Examines local and/or global perspectives, contexts and/or impacts 7 Involves action—prompts or requires students to apply learning to a real issue, concern or situation 8 Connects classroom learning to community organizations, resources, initiatives, or needs 9 Involves inquiry—open-ended, student centered questioning 10 Demonstrates interdependence of economic, environmental, and social systems
Central practices	
<p>Experiential Education “creating opportunities for students to experience the content of their curriculum, to make it relevant and connected to the “real world.”</p> <p>Place-based learning “...we need to cultivate student awareness and understanding of our natural and human communities. From that understanding or ‘sense of place,’ they can begin to comprehend the complex interactions of local (and later global) environmental, economic, and social needs...”</p> <p>Service learning “...a strategy that combines the principles of experiential learning with service to the community in support of the student’s personal, academic and social development.”</p>	

Table 3. Education for sustainability, as conceptualized by Shelburne Farms and collaborating organizations.

The US Partnership for Education for Sustainable Development

In the fall of 2003, an organization called the US Partnership for Education for Sustainable Development (USPESD) was formed to “leverage the UN Decade to foster education for sustainable development in the United States” (USPESD, 2009). Despite its formal-sounding title, the USPESD is an NGO operating without government mandate or financial support through the voluntary collaboration of participants from public, private and non-profit institutions. Although it has had a relatively small impact on primary and secondary education so far, the USPESD’s influence on sustainability standards in Washington State is indicative of the organization’s potential role in shaping American ESD over the coming years.

The USPESD advocates for policy change at the local, state and national level, but its primary role is to influence ESD practice by connecting practitioners with resources and with each other:

Participants decided that the Partnership would not design or implement programs of its own. Rather, it would serve as a clearing house - helping to connect, highlight, and foster collaboration among partners - and serving as a catalyst to convene groups and build community to support existing and emerging initiatives. (USPESD, 2009)

As one might anticipate given the USPESD's overt affiliation with the UN Decade, the concept of ESD that permeates the organization's materials is essentially identical to the concept of ESD found in UN documents. A notably broad idea of education characterizes the USPESD's efforts:

"Education for Sustainable Development" encompasses all forms of learning -- formal and informal - that help achieve the "triple bottom line" of healthy environments, thriving economies, and just societies. (USPESD, 09)

In keeping with this broad idea, formal education is only part of the USPESD's purview. In addition to a "sector team" focused on primary and secondary education, the USPESD includes sector teams focused on the private sector, on faith communities, and on higher education. The higher education sector team is perhaps the most active.

The USPESD has used three strategies to facilitate change in primary and secondary education: (1) strengthening practitioner networks through commonly used tools such as email lists and an ESD resource clearinghouse, (2) convening a nationwide "professional organizations summit" (USPESD, 2008a), and (3) authoring academic content standards intended to guide ESD practice (USPESD, 2008b). The summit drew an impressive array of representatives from organizations such as the National School Boards Association, the National Council for the Social Studies and the American Association of Colleges of Teacher Education. The academic content standards, officially titled *National Education for Sustainability K-12 Student Learning Standards*, are intended to serve as a model for the development of state and local standards. They are built around three essential understandings, and also include lists of ESD-related concepts organized by grade level. The essential understandings are shown in **Table 4**, below.

EfS Standard 1

Students understand and are able to apply the basic concept of sustainability (i.e.: meeting present needs without compromising the ability of future generations to meet their needs). They develop an understanding of the historical context in which the definitions, concepts, and principles of sustainability and sustainable development have emerged over time.

EfS Standard 2

Students recognize the concept of sustainability as a dynamic condition characterized by the interdependency among ecological, economic, and social systems and how these interconnected systems affect individual and societal well-being. They understand and experience their connection to and interdependence with the natural world.

EfS Standard 3

Students develop a multidisciplinary approach to learning the knowledge, skills, and attitudes necessary to continuously improve the health and well-being of present and future generations, via both personal and collective decisions and actions. They understand and can describe their vision of a world that is sustainable, along with the primary changes that would need to be made by individuals, local communities, and countries in order to achieve this.

Table 4. Essential understandings from the *National Education for Sustainability K-12 Student Learning Standards*

The effectiveness of these three strategies remains to be seen, although the influence of USPESD standards on the EES standards in Washington State is an encouraging sign. Because the USPESD has chosen to act on a national scale, its efforts are necessarily more diffuse than those of Shelburne Farms and other, more locally concentrated organizations.

The Cloud Institute for Sustainability Education

The Cloud Institute for Sustainability Education is a small non-profit organization based in New York City and

...dedicated to the vital role of education in creating awareness, fostering commitment, and guiding actions toward a healthy, secure and sustainable future for ourselves and for future generations. (Cloud Institute, 2009)

The Cloud Institute defines sustainability and ESD (which the Institute refers to as “sustainability education”) in ways that echo the central tenets of intergenerational equity and the “triple bottom line” espoused elsewhere in American ESD. Like Shelburne Farms, however, the Cloud Institute further elaborates the idea of sustainability education with a set of principles and pedagogical strategies, and offers a set of key characteristics of sustainability education, shown in **Table 5**.

Characteristics features of sustainability education As outlined in the documents of the Cloud Institute for Sustainability Education	
Habits of mind that students will demonstrate	Core content that students will study
<p>Understanding of Systems as the Context for Decision Making The extent to which one sees both the whole system and its parts as well as the extent to which an individual can place one's self within the system</p> <p>Intergenerational Responsibility The extent to which one takes responsibility for the effect (s) of her/his actions on future generations</p> <p>Mindful of and Skillful with Implications and Consequences The extent to which one consciously makes choices and plans actions to achieve positive systemic impact</p> <p>Protecting and Enhancing the Commons The extent to which one works to reconcile the conflicts between individual rights and the responsibilities of citizenship to tend to the commons</p> <p>Awareness of Driving Forces and their Impacts The extent to which one recognizes and can act strategically and responsibly in the context of the driving forces that influence our lives</p> <p>Assumption of Strategic Responsibility The extent to which one assumes responsibility for one's self and others by designing, planning and acting with whole systems in mind</p> <p>Paradigm Shifter The extent to which one recognizes mental models and paradigms as guiding constructs that change over time with new knowledge and applied insight</p>	<p>Ecological Literacy Science principles and natural laws that help us to understand the interconnectedness of humans and all of the Earth's systems...</p> <p>System Dynamics/"Systems Thinking" Understanding systems as the context for decision-making...</p> <p>Multiple Perspectives Truly valuing and learning from the life experiences and cultures of others...</p> <p>Sense of Place Connecting to and valuing the places in which we live...</p> <p>Sustainable Economics An evolving study of the connections between economic, social and natural systems...</p> <p>Citizenship (Participation and Leadership) The rights, responsibilities, and actions associated with participatory democracy toward sustainable communities...</p> <p>Creativity and Visioning The ability to envision and invent a rich, hopeful future...</p>

Table 5. Sustainability Education, as conceptualized by the Cloud Institute.

Even on cursory examination, this vision of ESD is noticeably *more* oriented toward action and decision-making than other ESD frameworks, and somewhat less oriented toward reflection and critical thinking. This is in keeping with the Cloud Institute’s “Framework for Education for Sustainability,” which portrays individuals and classrooms as change agents within a set of nested social systems (see **Figure 2**, below).



Figure 2. The Cloud Institute Framework

Like the other NGOs described above, the Cloud Institute produces ESD resources, such as two secondary school courses on sustainable design and sustainable enterprise that it developed on behalf of the New York City public schools. Unlike many other NGOs, the Cloud Institute plays an unusual role as a sustainability consulting service for school systems that are attempting to adopt sustainability as a central theme in their pedagogy and policies. The exact nature of this service varies from project to project, but it typically involves a prolonged on-site consultation process with school staff, in which staff are required to develop both a shared understanding of sustainability and what the institute's director, Jaimie Cloud, refers to as "a personal rationale for why they should do [sustainability education]" (Cloud, 2009b).

The North American Association for Environmental Education

Of all American NGOs, the North American Association for Environmental Education (NAAEE) has probably had the greatest influence on EE practice—and, by extension, on American ESD. The NAAEE was founded in 1971 under a slightly different name: the National Association for Environmental Education. Although it is now the most prominent professional association for environmental educators across the continent, its founders were representatives from a small group of two-year community colleges who planned to use the new association to disseminate college-level curriculum materials. According to Disinger (2005), the organization's expansive title attracted a wide range of practitioners, and its goals grew and changed with its membership. NAAEE has remained strongly committed to EE practice throughout its history, and has a more limited record of fostering and disseminating high-quality research. Disinger argues that the organization's desire to be "inclusive of all who expressed an interest in environmental education" has historically led to a "lack of focus," but that the NAAEE has recently "demonstrated increasingly creative leadership" (ibid., p. 148).

The most compelling signs of NAAEE's leadership are its thriving annual conference, which now includes sessions devoted to research, and its increasingly prominent, consensus-driven efforts¹² to raise the quality of EE practice around the country. The central component of NAAEE's efforts is the landmark document *Environmental Education Materials: Guidelines for Excellence*. First published in 1996 and revised in 2004, the *Guidelines*

¹² Two of these efforts, the *Environmental Education Collection* and the NAAEE's collaboration with the National Council for the Accreditation of Teacher Education, are described in later sections.

aim to help developers of activity guides, lesson plans, and other instructional materials produce high quality products, and to provide educators with a tool to evaluate the wide array of available environmental education materials. (NAAEE, 2004)

The *Guidelines* are not a summary of research on “what works.” They are the fruit of a consensus process, involving more than a thousand practitioners, that was intended to produce “a *common understanding* of effective environmental education” (ibid., emphasis added). As such, they offer some clear indications of what American EE practitioners consider to be good practice. The six key characteristics that form the backbone of the document are reproduced in **Table 6**.

Key characteristics of effective environmental education materials From Environmental Education Materials: Guidelines for Excellence (NAAEE, 2004)
<p>Fairness and Accuracy EE materials should be fair and accurate in describing environmental problems, issues and conditions, and in reflecting the diversity of perspectives on them.</p>
<p>Depth EE materials should foster awareness of natural and build environment, and understanding of environmental concepts, conditions, and issues, and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues, as appropriate for different developmental levels</p>
<p>Emphasis on Skills Building EE materials should build lifelong skills that enable learners to prevent and address environmental issues.</p>
<p>Action Orientation EE materials should promote civic responsibility, encouraging learners to use their knowledge, personal skills, and assessments of environmental issues as a basis for environmental problem solving and action.</p>
<p>Instructional Soundness EE materials should rely on instructional techniques that create an effective learning environment.</p>
<p>Usability EE materials should be well designed and easy to use.</p>

Table 6. Excerpts from Environmental Education Materials: Guidelines for Excellence (NAAEE, 2004)

The six key characteristics, later divided into 28 recommendations, are noticeably broad—a necessity, given the NAAEE’s desire to create guidelines that applied to both school-based and out-of-school learning experiences, adult-oriented and child-oriented programs of all varieties. They also highlight the differences between mainstream American EE and ESD, in both its international and American incarnations. Unless one defines “environmental problems, issues and conditions” as *inherently* inclusive of economic and social equity concerns (which some EE practitioners do), none of the six principles address either of these central concerns of ESD.

This has not gone unobserved within the NAAEE. Some of the association’s members have formed a Sustainability Education Commission within the NAAEE. The Commission is still a minority branch within the NAAEE, and sees internal advocacy as a crucial part of its mission, aiming to “promote sustainability as both an operational and content priority at annual NAAEE conferences” (NAAEE-SEC, 2006).

Part 3: American ESD in Research and Practice

Critical context: EE, ESD and schooling

This section of the report addresses three areas of school-based ESD: curriculum and pedagogy (which are practically inextricable), teacher education and whole-school approaches to ESD. The substantial body of research on curriculum and pedagogy merits its own discussion and is therefore separated out from the discussion of curricular and pedagogical practice. On the other hand, research on ESD-related teacher education and on whole-school approaches to ESD is relatively scarce, so what little research as exists on those topics is integrated into discussions of practice. Most of the available data on ESD and EE, both research and practice, is local and program-specific. As a result, this section may feel more fragmentary than the previous sections.

Because so few educational projects in the United States bear the label ESD (or education for sustainability, or sustainability education), most of this chapter will focus on educational programs and research implemented under the heading of environmental education. This strategy is consistent with the rest of the report, and reflects the substantial overlap between ESD and EE in the United States, but it is a particularly uncomfortable compromise in discussions of curriculum, where the differences between ESD and EE are most obvious.

When considering the status of EE in primary and secondary schooling, it is important to keep in mind that formal and informal traditions of EE in the United States are equally venerable. Because EE has never gained a substantial foothold in the primary or secondary curriculum, the American EE community has come to be dominated by educators and who work outside of schools. Furthermore, many of the most active and widely cited EE researchers focus on informal or non-formal learning environments (Dillon, 2003). These educators and researchers have maintained a vital and innovative program of activities, most of which is outside the purview of this report.

The state of practice in ESD curriculum and pedagogy

Prominent models of EE pedagogy

Even within the subset of the EE community that focuses on primary and secondary education, EE in the United States is historically a decentralized field. One great advantage of this is the degree to which EE programs around the country reflect local issues and local cultural norms. One disadvantage is the lack of national-level *data* that results from decentralization. Although there is little doubt that American EE has grown consistently throughout the past two decades (NEEAC, 2005), there are few statistics on the prevalence of EE in the United States, and those statistics that do exist are difficult to interpret. For example, Coyle notes that “nearly half of all K-12 teachers indicate they teach EE during the school year” (Coyle, 2005, p. 68), but most indicated that they spent little time on environmental topics, and no data is available of the topics taught or the pedagogical strategies used.

In the past, perhaps the most common means of providing EE through schools was to take children out of them. Field trips and outdoor excursions enable school-based educators to collaborate with informal educators who often have more training in EE, and they remain a popular tool for school-

based EE. The outdoor emphasis of EE is reflected in a potentially revolutionary piece of pending¹³ federal legislation called the No Child Left Inside Act, or NCLI (a play on the No Child Left Behind Act of 2001, described in the first section of this report). If passed, NCLI will provide support for a EE both within the traditional disciplines and outside of them; it will also support “field education” programs as an integral part of school-based EE.

There is no standard pedagogy for school-based EE. Amid the tapestry of instructional approaches, however, a number of distinct models are becoming established. One such model, which bears the awkward name of Investigating Environmental Education Issues and Actions (IEEIA), is based on the behavior change theories of Harold Hungerford and Trudi Volk (e.g., Hungerford and Volk, 1990). According to Volk and Cheak (2003), IEEIA is

a skill-development program, designed to help learners take an in-depth look at environmental issues in their community, to make data-based decisions about those issues, and to participate in issue resolution (Volk and Cheak, 2003, pp. 12-13).

IEEIA is among the most thoroughly documented pedagogical strategies in EE. It is characterized by a core set of instructional elements that are integrated into a flexible, open-ended program emphasizing complex environmental problems that touch in the lives of students. The core elements are shown in **Table 7**. One of the unique features of IEEIA is the involvement of students in systematic collection and analysis of data through surveys and questionnaires.

Chapter I. Environmental Problem Solving

- Students learn about their interactions with the environment.
- Students explore the impact of beliefs and values on environmental issues.
- Students analyze environmental issues.

Chapter II. Starting Issue Investigation

- Students identify environmental issues and write research questions.
- Students learn how to access information from print, electronic and human sources.
- Students compare and evaluate information sources.

Chapter III. Using Surveys, Questionnaires & Opinionnaires

- Students learn how to access information using first hand methods of investigation.
- Students learn how to develop and evaluate research instruments.
- Students systematically collect and record data using surveys, questionnaires and opinionnaires.

Chapter IV. Interpreting Data In Environmental Issue Investigations

- Students learn how to produce and interpret data tables and graphs.
- Students learn how to draw conclusions, make inferences and formulate recommendations.

Chapter V. Investigating An Environmental Issue

- Students select and investigate environmental issues.

Chapter VI. Environmental Action Strategies

- Students learn four major methods of citizenship action.
- Students analyze individual and group actions.
- Students develop and evaluate action plans

Table 7. Instructional elements of IEEIA (CISDE, 2009)

Another distinct pedagogical movement is referred to as Environment-Based Education¹⁴ (EBE). EBE encourages the use of environmental themes to enhance instruction within and across the

¹³ NCLI was most recently introduced to the both houses of the United States Congress on April 22, 2009; it has substantial bipartisan support but is unlikely to be a high legislative priority in the coming year.

¹⁴ An organization called the State Environment and Education Roundtable (SEER) has pursued EBE under a trademarked name: Environment as an Integrating Context™ (e.g., Lieberman and Hoody, 1998). EIC™ is treated here as a particularly well-articulated and well-documented *form* of EBE, rather than a separate entity.

traditional academic disciplines. The pedagogy of EBE is typically described as “interdisciplinary, collaborative, student-centered, hands-on and engaged” (NEETF, 2000). **Table 8** offers a more complete list of characteristics associated with a particular form of EBE called Environment as an Integrating Context, or EIC. From a curricular perspective, the crucial feature of EBE is *integration*: the use of environmental topics to integrate instruction across multiple learning contexts. In the archetypal EBE lesson, teachers from multiple disciplines coordinate their planning so that students repeatedly address a complex and compelling environmental problem using different disciplinary tools as they travel from class to class. This integrative strategy is similar to that favored by most American proponents of ESD. Although EBE is sometimes criticized within the EE community for its use of EE as a means to disciplinary ends, rather than an end unto itself, the constraining pressures of standards-based educational reform make it an attractive option for schools seeking to pursue ESD without sacrificing achievement in the traditional disciplines.

<p>Local Natural and Community Surroundings as Context</p> <ul style="list-style-type: none"> A. Use local natural and community surroundings as a context for interconnecting all of the educational practices of the EIC Model™ into a comprehensive school improvement strategy; and, B. Use local natural and community surroundings as a context for standards-based instruction. <p>Natural and Social Systems</p> <ul style="list-style-type: none"> A. Develop students' understanding of natural systems in their community; B. Develop students' understanding of social systems and their community's cultural characteristics; and, C. Develop students' understanding of interrelationships and interactions among natural and social systems and their components. <p>Community-based Investigations</p> <ul style="list-style-type: none"> A. Offer students opportunities to apply skills and knowledge in local surroundings; B. Provide students with opportunities to investigate real-world community problems and issues; C. Encourage use of higher-level thinking and creative problem-solving skills to achieve comprehensive understanding of the complexity of real-world problems and issues involving the interaction of their natural surroundings with diverse cultural, economic, and political perspectives and interests; and, D. Provide students with opportunities to pursue authentic issues of personal interest to them. <p>Integrated, Interdisciplinary Instruction</p> <ul style="list-style-type: none"> A. Provide students with opportunities to explore connections between subject area disciplines and, among natural and social systems; B. Coordinate students' learning between subject areas and class periods; and, C. Cross traditional disciplinary boundaries to develop comprehensive understanding of natural and social systems. <p>Service-Learning</p> <ul style="list-style-type: none"> A. Support students as they undertake and monitor service-learning activities; B. Require students to reflect on their service-learning activities and communicate their findings to classmates, teachers and other appropriate audiences both inside and outside of their community; and, C. Creates a continuum of learning that crosses grade levels and allows students to conduct multi-year research and service-learning projects that contribute to their community. <p>Collaborative Instruction</p> <ul style="list-style-type: none"> A. Involve students and community members in planning and instructional delivery; B. Provide opportunities for teachers to model positive team relationships; and, C. Allow teachers to have regularly scheduled team meetings. <p>Learner-centered, Constructivist Approaches</p> <ul style="list-style-type: none"> A. Take into account students' individual learning styles, multiple intelligences and cultural background to insure effective instructional design and practices in the context of the local community; B. Assist students as they initiate self-directed courses of study; C. Allow students to construct their own understandings; and, D. Support students as they define specific learning goals and objectives. <p>Cooperative and Independent Learning</p> <ul style="list-style-type: none"> A. Facilitate students as they form teams to work on projects and investigations; B. Assure that student teams include a wide range of learning styles and ability levels; and, A. C. Help students develop group membership skills.

Table 8. The EIC Model™, reproduced from <http://www.seer.org/pages/eicdetail.html>

Recently, the EBE program has been adapted, re-interpreted and elaborated under a slightly different name: Place-Based Education (PBE). Although the overlap between EBE and PBE research is substantial, with researchers citing each as evidence for the other, Place-Based Education is more theoretically sophisticated. Powers (2004) integrates a number of constructs into an explicit “theory of change” for place-based education, shown in **Figure 3**.

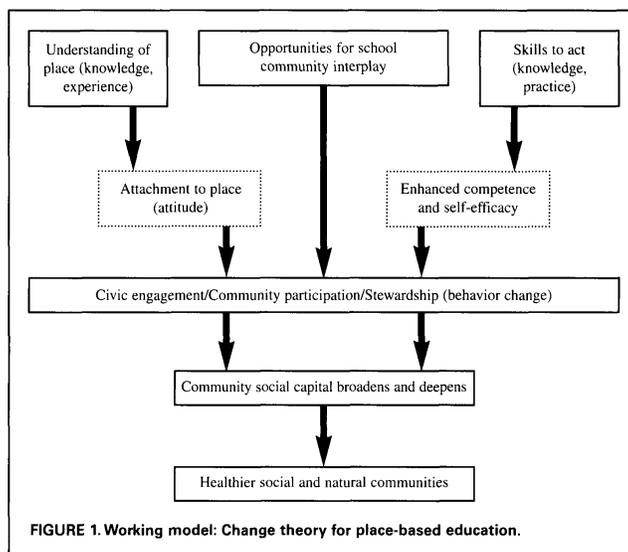


Figure 3. Theory of change for Place-Based Education, reprinted from Powers, 2004 (p. 20)

Place-Based Education is also more explicitly connected to sustainability. According to The Promise of Place, an online clearinghouse for relevant materials, PBE is

a holistic approach to education, conservation and community development that uses the local community as an integrating context for learning at all ages. It fosters vibrant partnerships between schools and communities to both boost student achievement and improve community health and vitality--environmental, social and economic. Project-focused and inherently tailored by local people to local realities, place-based education is relevant to anyone, anywhere. (Promise of Place, 2009)

This definition is undeniably and deliberately similar to commonly cited definitions of ESD.¹⁵ The Place-Based Education Evaluation Collaborative, a collection of the NGOs that have been most active in studying and promoting PBE, cites the Brundtland Report in its conceptual overview and notes that “PEEC wants to further examine the confluence of ideas between ‘place-based’ and ‘education for sustainability’” (PEEC, 2003, p. 4). In focusing on community issues and the need to adapt education to local conditions, PBE reflects the strong emphasis on community and local participation that has consistently characterized ideas of ESD in the United States.

Resources and standards: the progress of EE and ESD curriculum in the United States

In the United States, it is quite normal for curriculum reform to proceed through an unplanned “push-pull” process, in which the content of instruction is shaped by legislative “pushes” from state and local government and “pulls” in the form of resources from independent curriculum developers. This process, which seems terribly inefficient to outside observers, is a natural consequence of the fact that most American teachers have substantial autonomy in choosing what

¹⁵ Shelburne Farms, an NGO described in detail above, is one of the national innovators in PBE, and also one of the leading voices for ESD in the United States.

to teach. Federal, state and local authorities constrain teacher autonomy by setting standards or, more rarely, by requiring teachers to use particular textbooks or resources. Working within these constraints, teachers often choose to adopt or adapt existing curriculum materials rather than develop their own—particularly when they lack confidence or expertise in subject they are required by law or moved by principle to teach. Because most teachers lack adequate training in EE and ESD, as will be discussed below, the menu of externally produced resources has a significant impact on practice.

There is no shortage of groups, including university-based research groups, for-profit companies and NGOs, that produce EE and ESD-relevant curriculum resources. Some of these resources, such as the water education materials produced by Project WET (<http://www.projectwet.org/>), have reached millions of children in the United States and other countries. The diverse array of resources presents a challenge in its own right: teachers must choose from a bewildering selection of materials. It is not surprising, in these circumstances, that many of the most widely used EE curricula are disseminated by organizations that also offer teacher training or other forms of professional support.

Many NGOs have attempted to assist practitioners by collecting and indexing EE resources. The most ambitious of these attempts is the online clearinghouse established by the NAAEE, officially called *The Environmental Education Collection: A Review of Resources for Educators*. After soliciting hundreds of EE resources from public and private sources, the NAAEE implemented a peer review process in which each resource was evaluated by “teams of classroom teachers, content experts, and environmental educators” (NAAEE, 2004b), using the NAAEE’s *Guidelines for Excellence* as evaluation criteria.

As might be expected, EE curriculum resources vary widely in their relevance to ESD. A strong *programmatic* focus on social equity is notably absent from many of the most prominent EE curricula. Although there has always been a thread of concern for equity and social justice within the broader field of environmental education (cf. Cole, 2007), Kushmerick, Young and Stein (2007) found that this concern was only addressed rarely in mainstream EE resources. Framing their analysis in terms of environmental justice, they noted that

these curriculum guides often address issues related to environmental justice (e.g. environmental health impacts on humans); however, they rarely present the issues within an explicit environmental justice context. The guides also rarely address issues traditionally considered to be environmental justice issues. The results show many missed opportunities to incorporate environmental justice, indicating that lessons could be adapted easily to be more inclusive. (Kushmerick, Young and Stein, 2007, p. 385)

The interlinked influence of national, state and NGO influences on American ESD, part 2

The Environmental Education Collection represents another clear case of the way in which federal agencies, state agencies and NGOs combines to affect ESD practice. The NAAEE, the largest professional association of environmental educators in the United States, is funded in part through the support of its members and in part through project-specific grants from the federal government. *The Environmental Education Collection* benefited from federal support, as did many of the peer-reviewed resources it contains. The adoption of these resources by primary and secondary teachers is constrained by standards and requirements at the state level.

Expanding popular support

Although the NAAEE and other organizations have succeeded in adding a degree of coherence to the chaotic marketplace of EE curriculum resources, the implementation of EE and ESD is still a piecemeal affair. Teachers who were personally committed to ESD adopted EE or ESD materials as supplements to the core academic curriculum *or* pursued isolated EE and ESD content goals in the

context of disciplinary instruction. Coyle, surveying a decade's worth of national survey data on EE, noted that "EE it is still mostly considered an educational 'extra' – grafted on to a core syllabus as an enhancement" (Coyle, 2005, p. 51). When EE and ESD materials are included in instruction, they typically appear in the disciplinary context of science. This is true despite the fact that American advocates of EE and ESD see both as interdisciplinary endeavors, having as much to do with the arts and humanities as the natural and social sciences. The only environmentally focused course that is available in a significant number of American public schools today is environmental science.¹⁶

This may be changing. Perhaps the most significant outcome of past school-based EE and ESD is a foundation of popular support for more coordinated and substantive school-based EE and ESD in the future. Community support for EE has expanded significantly in recent years, to the point that 95% of Americans support some form of EE as part of public schooling (ibid., p. 65). Although this cannot be attributed entirely to classroom-based EE, the isolated efforts of classroom teachers in previous years have probably contributed to the broad cultural acceptance of EE. This expansion of community support has, in turn, been reflected in the adoption of statewide standards that address "environmental literacy" objectives. Because no state has instituted a rigorous assessment of its EE or ESD-related standards, thought, there is little pressure to devote instructional time or resources to EE or ESD, and no way of knowing the overall impact of the new state standards.

Research on ESD curriculum and pedagogy

Effectiveness and the importance of behavior change in American EE and ESD

Discussions about "what works" in EE are inevitably controversial due to pervasive disagreement about the desirable outcomes of EE. According to the NAAEE, the primary goal of EE is "environmental literacy," a broad construct that includes

affect, ecological knowledge, socio-political knowledge, knowledge of environmental issues, skills, environmentally responsible behaviors, and determinants of environmentally responsible behaviors. (Simmons, 1995, cited in NAAEE, 2007).

This definition excludes very little. Other writers (e.g., Coyle, 2005) have emphasized the non-behavioral aspects of environmental literacy as distinct from behavioral outcomes. The NAAEE's emphasis on behavior is consistent with the history of American EE, which has been significantly influenced by scholars such as Hungerford and Volk, who argue that "the ultimate *aim* of education is shaping human behavior" (Hungerford and Volk, 1990; emphasis in original). This perspective appears to be a throwback to behaviorist psychology, but actually has more in common with contemporary research in public health. Like public health researchers, behavior-oriented EE researchers acknowledge the importance of cognitive, emotional and motivational variables, but argue that changes in these variables are only significant if they lead to positive material developments—in this case, positive environmental developments (ibid.). They are behaviorists only with respect to *outcomes*, not processes.

Some researchers and educators object to this approach on the grounds that it is undemocratic—that the behavior change approach to EE implies that environmental educators already know what problems are important, what behaviors are best, and when behavior change is necessary. In

¹⁶ Enrollment in the (elective) Advanced Placement exam in Environmental Science has increased 75% since 2003—one more sign of the increasing interest in EE-related material within the K-12 school system. (College Board, 2008).

response, proponents of the behavior change perspective, such as Chawla and Cushing (2007), have offered a more nuanced model in which the goal is to develop students' capacity to determine when change is needed, and to change their behavior only in these circumstances. This model of *strategic environmental behavior* has its own challenges. For example, it is difficult to imagine how educators might evaluate the latent capacity of their students to do something that is not called for at present. Still the model of strategic environmental behavior is more compatible with the official position of government agencies involved in EE, such as the Environmental Protection Agency. In the EPA's materials, EE

...increases public awareness and knowledge of environmental issues, does teach individuals critical-thinking, does enhance individuals' problem-solving and decision-making skills, [but] does not advocate a particular viewpoint. (EPA, 2008)

In addition to the disagreement over outcome measures, the fragmentary nature of ESD-related research makes it difficult to draw general conclusions about effectiveness. Rickinson, who conducted one of the only comprehensive reviews of K-12 EE, observed that:

...there is research on a variety of foci but there are few connections made in the literature between these concentrations of evidence. There are few cross-references made by individual studies to other pieces of work, there are few review-style articles seeking to present and synthesise findings from different studies, and there is little conceptual discussion between different kinds of approaches. (Rickinson, 2001, p. 217)

Participants in NAAEE's research symposium reached similar conclusions at the end of the symposium's third year, noting that "environmental education research is still in early development of a professional perspective," and that "more meaningful dialogue" between researchers was necessary (Meyers et al., 2007). Given these circumstances, this report will not attempt a comprehensive review¹⁷ of American EE research, focusing instead on a few key findings.

Research findings

Regardless of their theoretical stance on behavior change, most EE researchers in the United States use knowledge and attitudinal¹⁸ outcome measures rather than behavioral outcome measures. For some, these variables are a proxy for behavior change. For others, they are a viable outcome in their own right. In either case, they are often most useful as program evaluation tools and offer far less value as measures of effectiveness for more general curricular or pedagogical practices. This is because very few studies contain sufficient qualitative or quantitative data to reveal which aspects of a given intervention were critical to its success.

Given the fragmentary nature of the research, as described by Rickinson (2001) and Meyers, et al. (2007), the most that can be said from reading across these studies is that some interventions are successful in improving environmental attitudes or knowledge with some students, some time, and that relatively few interventions do both. Interventions that focus on specific curricular content tend to improve knowledge without changing attitudes (e.g., Milton et al., 1995), while interventions that focus on vivid, minimally structured experiences (typically outdoor experiences)

¹⁷ Admirable but incomplete efforts to review the EE research literature can be found in Rickinson (2001) and Coyle (2005). The detailed *responses* to Rickinson's review, particularly the response by Dillon (2003), also provide useful overviews of the field from very different perspectives.

¹⁸ The word "attitudinal" is an inadequate shorthand for the host of motivational and affective variables that EE researchers have measured, including such characteristic EE constructs as "environmental sensitivity," which Hungerford and Volk (1990) define as "an empathetic perspective toward the environment."

tend to change attitudes without budging knowledge scores. (e.g., Smith-Sebasto and Senrau, 2004; Farmer, Knapp and Benton, 2007). In sum, most EE research is disappointingly quiet on the more general question of “what works.”

The most promising exceptions are those already described above: Investigating Environmental Education Issues and Actions, Environment-Based Education/Place-Based Education. Each of these instructional strategies is grounded in clear theoretical premises and has been subject to multiple tests across different contexts. Although the outcome measures and the quality of outcome data vary widely from study to study, the results have been remarkably consistent.

At the 2000 annual meeting of the NAAEE, Hungerford, Volk and Ramsey summarized the research on IEEIA. They cited fourteen papers describing eleven separate tests of IEEIA conducted over twenty years. Although their summary revealed persistent methodological weaknesses¹⁹ in the research on IEEIA, it also conveyed the uniformly positive nature of the results. In each of the eleven cases, the students participating in IEEIA exhibited some type of environmentally relevant behavior change. In most of the cases, behavior change was accompanied by shifts in other skill, knowledge and attitudinal variables (Hungerford, Volk and Ramsey, 2000). Research on IEEIA continues: Volk and Cheak (2003) offer a detailed account of the impact of IEEIA on middle school students in Molokai, Hawai'i, describing for the first time the broader effects of the IEEIA intervention on the surrounding community. Methodological flaws notwithstanding, it is difficult to ignore the consistent success of IEEIA in catalyzing changes in environmental behavior across multiple contexts.

The evidence for EBE is equally compelling, perhaps moreso, but relies on a very different sort of data. Unlike IEEIA, which targets environmental behavior, EBE is explicitly framed as a strategy for improving academic performance in core academic fields. In 1998, Lieberman and Hoody synthesized data from 40 schools implementing EBE in 12 states across the country. For fourteen of these schools, students participating in EBE programs could be compared with their peers in non-EBE programs. The results were unequivocal: student achievement was higher in subjects such as social studies, math and science; reading scores also improved, sometimes dramatically (Lieberman and Hoody, 1998). In addition to the academic gains, many schools showed motivational gains, reductions in disruptive behavior, and qualitative shifts in student engagement (*ibid.*). A later study in California compared four schools implementing EBE with four demographically and academically matched schools, with similarly impressive results (SEER, 2005).

As with the research on IEEIA, it is possible to find conspicuous weaknesses in the methods used to study EBE. In particular, schools that are not implementing any sort of comprehensive reform are a poor comparison group for schools that are. Nevertheless, the size and breadth of the documented effect is impressive, and has been supported by quantitative data from more recent research (Athman and Monroe, 2004) and evaluation studies (Falco, 2004), as well as qualitative data from case studies documented by the National Environmental Education and Training Foundation (NEETF, 2000). Studies conducted under the rubric of PBE have added to the picture by expanding the range of positive outcomes. Whereas research on EBE has consistently emphasized academic achievement, PBE researchers focus on a host of new outcomes, including improved community-school relationships, stronger collaboration between teachers and improved

¹⁹ For example, almost all of the studies relied on post-only comparisons between intact groups. In addition, the comparability of comparison groups and the appropriateness of comparison conditions were imperfectly established in most studies.

outcomes for students with special needs (Powers, 2004). Most recently, Duffin, Murphy and Johnson (2008) have even taken the first step towards demonstrating a connection between PBE programs and local environmental quality.

The importance of local participation

As noted above, the fragmentary state of evidence on American EE and ESD makes it difficult to say what pedagogical and curricular strategies are and are not effective. It is reasonably clear, however, that field trips and outdoor experiences, as typically practiced, do not produce reliable results. The same could be said for a single-minded focus on environmental science. Hungerford, Volk and Ramsey argue that

Needless to say, what people *know* is important. Yet, *knowing* will not provide the learner with what we refer to as *ownership* and *empowerment*. If we want learners to become actively involved in issue investigation and evaluation as well as active citizenship outside of school it appears rather clear that ***they must own the issues on which they focus and both feel and be empowered to do something about them.*** (Hungerford, Volk and Ramsey, 2000, p. 3, emphasis in original)

The most likely route to empowerment—and to a range of other positive outcomes including enhanced academic achievement and pro-environmental behavior—appears to be sustained participation in complex environmental projects that cut across disciplinary lines. Furthermore, the intervention strategies that have achieved the most compelling and well-documented success have all focused on participation in local community contexts. Each of these interventions is multi-faceted and difficult to summarize, but the common emphasis on community is undeniable.

A steady trickle of findings from outside the established instructional movements (IEEIA, EBE and PBE) supports this theory. Educational programs that emphasize active participation in conservation activities (Leeming, 1997; Randler, Ilg and Kern, 2005), particularly when those activities are embedded in the local natural and social context (Barnett, Lord and Strauss, 2006; Bodzin, 2008) produce broad motivational and academic gains. They may even have a ripple effect throughout the community (Volk and Cheak, 2003; Duvall and Zint, 2007).

ESD and teacher education: Research and practice

EE, ESD and teacher education

The ideas of sustainability and ESD are even less well developed in American teacher education than they are in curricular and pedagogical reform. Nolet (2009) has made an important first attempt to outline what teacher preparation for ESD might look like, but his work is essentially unique in the academic literature. As a result, this section focuses almost exclusively on teacher education efforts associated with EE.

In the entire public school system of the United States, there are very few teachers who teach *only* EE or ESD.²⁰ Yet, according to a 2000 study conducted by the NAAEE and the Environmental Literacy Council (reported in Coyle, 2005), 83% of elementary teachers and 44% of secondary teachers offer *some* EE in their classrooms. Because most EE degrees in the United States emphasize out-of-school learning, these teachers received little or no pre-service training in EE.

²⁰ As previously mentioned, there is a small and growing cadre of teachers who specialize in environmental science; some states, though by no means all, require a separate certification for this subject area.

The next generation of teachers, including those currently enrolled in teacher preparation programs, is slightly better off. In response to the rise in public acceptance of EE, and the rising social prominence of environmental and sustainability topics, many states have modified their teacher certification requirements to include some exposure to environmental curriculum and pedagogy. This flurry of state-level legislation has, in turn, led colleges and schools of education to offer EE coursework and use EE materials in the context of their teacher preparation programs. McKeown-Ice (2000) conducted a survey of teacher preparation programs nationwide, and reported that about half offered some form of EE. The mere existence of EE in pre-service teacher preparation does not guarantee that graduating teachers are sufficiently prepared, however. In less than 15% of cases were EE courses required, rather than optional, and about two-thirds of responding institutions ranked the effectiveness of their own EE preparation as “poor” or “adequate” rather than “good” or “excellent” (ibid.). A similar survey by Heimlich et al., four years later, found the situation largely unchanged (Heimlich et al., 2004).

This is not to say that the programs have had *no* effect. A 2001 comparison of elementary school teachers in the state of Wisconsin (which mandated some EE as part of certification) and the state of Ohio (which did not) found that teachers in Wisconsin were incorporating more EE materials into their classroom activities, and seemed more confident about their ability to do so effectively (Plevyak et al., 2001). On the other hand, both this study and another, more recent study in Pennsylvania found that many teachers received no EE preparation despite the certification laws in those two states (Plevyak et al., 2001; Mastrilli, 2005).

Why is progress so slow, given the rising tide of legislation that promotes or requires EE as a component of teacher education? Teacher certification in the United State is a governed by a patchwork of state and local regulation that is, if anything, less coherent than the process that governs curriculum. It has been argued that the idea of “alternative certification” is nonsensical in the American context simply because there is no such thing as standard or traditional certification. Most states set basic criteria that new teachers must meet in order to teach in public schools. Teacher preparation programs strive to meet these criteria in their own idiosyncratic ways, loosely regulated through accreditation procedures run by both the state and by nation-wide NGOs such as the National Council for Accreditation of Teacher Education (NCATE). The means by which new teachers are assessed vary widely, and laws are often changed (to include EE, for example) without accompanying changes in statewide assessment procedures. When there are no mechanisms in place for enforcing compliance, EE competence remains firmly at the bottom of the long list of teacher preparation priorities (Powers, 2004b). Teacher education faculty from around the country also report that the disciplinary segregation of teaching methods coursework makes it difficult to encourage cross-disciplinary pedagogy, and that newly certified teachers find few EE role models among practicing teachers (ibid.).

In this grim context, there are two reasons for optimism. First, NCATE has recently endorsed a set of teacher education standards created by NAAEE to regulate the quality of EE teacher preparation (NAAEE, 2007). Although membership in NCATE is voluntary, more than half of the teacher preparation programs in the United States voluntarily submit to the NCATE certification process. For those programs, any EE degrees or coursework that they offer will now be subject to uniform quality standards. Although this may do little to encourage the development of new EE programs, it is likely to increase the consistency and coherence of EE in existing teacher preparation programs.

The second cause for hope is the widespread availability of professional development opportunities for practicing teachers. Duffin, Murphy and Johnson (2008) note that:

Programs such as Project Wild and Project Wet have trained more than one million teachers, and environmental curriculum packages focusing on a range of topics are widely available to educators at limited or no cost. (Duffin, Murphy and Johnson, 2008, p. 10)

In short, whether or not new teachers emerge from pre-service training with adequate EE preparation, they have an increasing number of opportunities to gain competence on the job.

Research on teacher preparedness and professional development

In recent years, ESD-related research has increasingly focused on teacher education, and, in particular, on the environmental knowledge and beliefs of pre-service and in-service teachers. As a whole, this research suggests that teachers reflect the general population: they are concerned about environmental problems and hold positive attitudes toward pro-environmental behaviors and policies, but are relatively uninformed about specific topics (e.g., Desjean-Perrotta, Moseley and Cantu, 2008). This is significant because there is also reasonably compelling evidence that lack of knowledge, particularly environmental knowledge, prevents teachers from using EE materials and strategies. For example, Ernst (2007) conducted a survey-based study of 287 teachers and concluded that

environmental literacy knowledge and skills and environmental sensitivity are important in teachers' decisions to use and their abilities to implement environment-based education. (Ernst, 2007, p. 15)

In a later study, Ernst found that teachers' use of particular materials and strategies, such as EBE, was best predicted by teachers' knowledge of the research on those materials and strategies (Ernst, 2009). The implication is that more generic EE training could increase the use of EE materials in general, but strategy-specific training is necessary for teachers to particular pedagogical or curricular approaches. This is reasonably intuitive, and many NGOs that develop curriculum materials for EE and ESD already seek to disseminate knowledge about their effectiveness and train teachers in their use.

Given that practicing teachers are inadequately preparation for EE and ESD projects, it should not be surprising that participation in EE and ESD projects can be discouraging for them. Moseley and Utley (2008) report that teachers who took part in one federally funded project (the GLOBE project: <http://www.globe.gov/r>), in comparison with a similar group of teachers who did not participate, were more likely to believe in the effectiveness of EE overall but less likely to believe that they personally could be effective in implementing EE. Haney, Wang, Keil and Zoffel (2007) found that teachers who developed and implemented place-based education improved their own sense of efficacy but became more pessimistic about the likelihood of obtaining administrative support for such efforts. Other studies suggest that PBE, one of most promising interventions from the perspective of student outcomes, also shows considerable promise as a mechanism for teacher professional development (Meichtry and Smith, 2007; Kenney, Militana and Donohue, 2003).

The whole-school approach to ESD

Whereas the idea of sustainability has made few inroads into American teacher education, it is surprisingly prominent in whole-school reform efforts. Apart from the whole-school implementations of EBE and PBE referred to above, dozens if not hundreds of schools around the

United States have instituted reforms based on what they identify as sustainability principles. Many of these schools, which are often called “sustainable schools” or “green schools,”²¹ are private or charter schools.²² As such, they are relatively independent local public school networks. Instead, they participate in national associations such as the Green Schools Alliance and the National Association of Independent Schools that support their sustainability-oriented programming.

Public schools that adopt sustainability principles rarely do so in isolation. In some cases, they are constituent members of districts or regions that have chosen to collectively pursue sustainability-based reform (such as the Putnam/North Westchester Board of Cooperative Educational Services in New York State, which is working with the Cloud Institute for Sustainability Education). In other cases, they are members of more diffuse statewide networks that share materials and expertise. Statewide networks of public schools with a sustainability focus can be found in states such as Vermont (<http://www.sustainableschoolsproject.org/>), Oregon (<http://sustainableschools.org/>), California (<http://www.green.ca.gov/GreenBuildings/schools.htm>), and New Jersey (<http://www.globallearningnj.org/ssn.htm>).

Both the national networks for independent schools and the statewide public school networks attempt to leverage local expertise and educational resources (often in the form of NGOs) to enhance school-based ESD. Thus, the idea sustainability is shared by all but has different connotations and implications in each network. For example, the National Association of Independent Schools (NAIS) uses the word sustainability to refer to the long-term viability of the school as well as to sustainable development writ large. Through the NAIS network (<http://www.nais.org/sustainable/index.cfm?ItemNumber=147756>), private and charter schools can access resources on:

- **Financial Sustainability:** becoming more efficient and less costly
- **Environmental Sustainability:** incorporating sustainability practices into teaching and practice; becoming more green and less wasteful
- **Global Sustainability:** becoming more networked internationally and less parochial in outlook
- **Programmatic Sustainability:** becoming more focused on the skills and values that the marketplace of the 21st Century will seek and reward, and less narrowly isolated in a traditional disciplines approach to teaching and learning
- **Demographic Sustainability:** becoming more inclusive and representative of the school-age population and less unapproachable financially and socially

Although NAIS is “committed to being a leader, model, and moral force for environmental sustainability in its member schools” (NAIS, 2009), it aims to do so through fostering practitioner collaboration and sharing resources rather than more explicit policies or principles.

The Green Schools Alliance (GSA) takes a narrower but more aggressive stance, focusing its efforts on the problem of global climate change. To become members of the GSA, schools must commit to:

²¹ Originally, the green schools movement was exclusively focused on the physical school building, its properties and their relationship to student health and performance; most of the research on “green schools” to date has focused on their health implications (BICE, 2006).

²² The relationship between the charter school movement and American ESD was discussed, briefly, earlier in this report.

...signing the Green Schools Climate Commitment at one of the following levels: 1) Climate Champion: Reduce my school's carbon footprint by at least 30% within 5 years, and achieve Carbon Neutrality by 2020; or 2) Climate Steward: Calculate my school's carbon footprint by establishing an energy and carbon emissions baseline, and achieve carbon reductions over time. (Green Schools Alliance, 2009)

To date, over 1500 schools have made one of these two commitments. Although significant in its own right, the narrow goal of reducing carbon emissions is intended to be the core of a more comprehensive effort to engage students, teachers and administrators in sustainability-related projects. According to the GSA's mission statement (*ibid.*) the Alliance aspires to (among other things):

- INSPIRE environmental stewardship, personal responsibility, leadership and cooperation
- EMPOWER schools to be agents of environmental change in their own communities
- ENGAGE all school community stakeholders in the fight against global climate change
- INTEGRATE education and action through diverse grassroots and institutional incentive programs.

The GSA's emphasis on "green" building and energy-use practices, and the idea that these practices can be a centerpiece of broader ESD efforts, is characteristic of whole-school ESD projects in the United States. Higgs and McMillan examined four schools that define their educational programs in terms of sustainability, and found that facilities and operations were a key way in which schools represented sustainability for their students. By involving students in school-wide efforts to use resources more sustainably, these four schools were able to catalyze significant shifts in awareness and engagement with sustainability issues, as well as behavior change (McMillan and Higgs, 2003, 2006). The pedagogical focus on the *physical* school can be seen as a form of Place-Based Education, in which the initial emphasis on the school community becomes a foundation for later action in the larger communities to which students, teachers and administrators belong. Because the research on whole-school approaches to ESD is in its infancy, very little can be said about its scope, successes and failures. No separate section on research has been included in this report.

Concluding notes

American ESD is in a comparatively early stage of development. Despite an expanding base of popular support, its growth is constrained by the absence of institutional commitment across all sectors of formal education. It is also hampered by internal ideological conflicts and by the historical ambivalence of the EE community regarding large-scale school-based educational programs. Although more teachers are attempting to incorporate EE or ESD materials in their teaching, there is little indication that they are well-prepared to do such work. It is hard to know whether or not their fragile efforts will survive in a political climate that emphasizes high-stakes assessment and traditional disciplinary measures of academic achievement.

There are signs of progress. Local innovation has produced several powerful working models. A small number of states have begun to address the challenges of bringing ESD into the mainstream—challenges that require coordinated policy change at all levels from teacher preparation to student assessment. In this context, and in light of the unanticipated fiscal stresses of the current economic downturn, it is particularly important that research is beginning to demonstrate the benefits of ESD, both in terms of sustainability outcomes and traditional academic measures.

There are two likely paths forward. The first assumes no change in the overall picture of ESD governance—no new federal initiatives, no alteration in the current state-by-state assessment regime, and no radically different activity from ESD-related NGOs. In this scenario, the tentative progress of states like Vermont and Washington will probably spread to a handful of other states that already have strong EE traditions and are expressing interest in ESD—states such as Oregon, Maryland and Wisconsin. A small number of teacher education programs will produce teachers capable of meeting the needs of those states, while the rest will do an incrementally better job of preparing ESD-capable teachers, in keeping with the new NCATE/NAAEE standards. The number of independent schools that emphasize ESD is likely to increase only slowly, unless one of the prominent charter school networks, such as KIPP (<http://www.kipp.org/>), adopts ESD or place-based education as an organizing strategy. In short, ESD will flourish in isolated archipelagos of practice, enabled by a combination of supportive NGOs and ESD-friendly (or hands-off) state policy. The only unpredictable factors in this picture are the professional networks, networks such as the National Science Teachers Association and the National School Board Association. Although these networks exert a weak and irregular influence on classroom practice, they are capable of spreading key ideas and expanding opportunities for interested practitioners on a national scale. If NGOs such as the USPESD, the Cloud Institute or Shelburne Farms are able to capture the interest of these networks despite competing priorities, ESD practice could spread across the country more rapidly.

The second path relies on some sort of unanticipated central influence, ostensibly though not necessarily from the federal government. This influence could take the form of expanded block grants for local innovation, an emphasis on ESD-related models for new charter school initiatives, or even federally supported infrastructure projects that hearken back to the original “green schools” movement. The most powerful change, without question, would be the inclusion of ESD in the rhetoric and policy of standards-based reform. The single incontestable legacy of the No Child Left Behind Act of 2001 has been a renewed awareness of the power of assessment to shape educational practice. If the federal government adopted benchmarks and indicators for ESD, or required states to do so in order to receive federal funding, ESD would rapidly become an integral piece of American public education. The consequences of *that* change would, of course, depend on the nature and quality of the indicators. In formulating an ambitious plan for the future, American advocates of ESD should pay careful attention to the formulation and implementation of nation-wide ESD indicators in other countries around the globe.

Bibliography

- Athman, J., & Monroe, M. (2004). The effects of environment-based education on students' achievement motivation. *Journal of Interpretation Research*, 9(1), 9-25.
- Barnett, M., Lord, C., & Strauss, E. (2006). Using the Urban Environment to Engage Youths in Urban Ecology Field Studies. *Journal of Environmental Education*, 37(2), 3-11.
- BICE - Board on Infrastructure and the Constructed Environment (2006). *Green Schools: Attributes for Health and Learning*. Washington, DC: National Academies Press.
- Bodzin, A. (2008). Integrating Instructional Technologies in a Local Watershed Investigation With Urban Elementary Learners. *Journal of Environmental Education*, 39(2), 47-57.
- Bomberg, E. (2009). Governance for Sustainable Development: The United States and the European Union Compared. In M. Schreurs, H. Selin & S. D. Van Deveer (Eds.), *Transatlantic Environment and Energy Politics* (pp. 21-40). Abingdon, UK: Ashgate Publishing, Ltd.
- Bonnett, M. (2002). Education for Sustainability as a frame of mind. *Environmental Education Research*, 8(1), 9-20.
- Carson, R. (1962). *Silent Spring*.
- Center for Education Reform (2009). Charter School Facts Retrieved 20 April, 2009, 2009, from <http://www.edreform.com/index.cfm?fuseAction=document&documentID=1964>
- Cloud, J. (2009). phone meeting.
- Cole, A. G. (2007). Expanding the field: revisiting environmental education principles through multidisciplinary frameworks. *Journal of Environmental Education*, 38(2), 35-44.
- Committee on Science, E., and Public Policy, (2007). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Washington, DC: National Academies Press.
- Coyle, K. (2005). *Environmental Literacy in America*. Washington, DC: National Environmental Education and Training Foundation.
- Dernbach, J. C. (2002). Learning from the president's council for sustainable development: The need for a real national agenda. *Environmental Law Reporter*, 32, 10648-10666.
- Dernbach, J. C. (2009). *Agenda for a Sustainable America*. Washington, DC: Environmental Law Institute Press.
- Desjean-Perrotta, B., Moseley, C., & Cantu, L. E. (2008). Preservice Teachers' Perceptions of the Environment: Does Ethnicity or Dominant Residential Experience Matter? *Journal of Environmental Education*, 39(2), 21-31.
- Dillon, J. (2003). On learners and learning in environmental education: missing theories, ignored communities. *Environmental Education Research*, 9(2), 215-226.
- Disinger, J. F. (2005). The purposes of environmental education: perspectives of teachers, governmental agencies, NGOs, professional societies, and advocacy groups. In E. A. Johnson & M. J. Mappin (Eds.), *Environmental Education and Advocacy: Changing perspectives of ecology and education*. Cambridge: Cambridge University Press.
- Duffin, M., Murphy, M., & Johnson, B. (2008). *Quantifying a Relationship between Place-based Learning and Environmental Quality*. Woodstock, VT: NPS Conservation Study Institute in cooperation with the Environmental Protection Agency and Shelburn Farms.
- Duvall, J., & Zint, M. (2007). A Review of Research on the Effectiveness of Environmental Education in Promoting Intergenerational Learning. *Journal of Environmental Education*, 38(4), 14-24.
- EPA - Environmental Protection Agency (2008). Environmental Education - Basic Information Retrieved 27 April, 2009, 2009, from <http://www.epa.gov/education/basic.html>
- EPA - United States Environmental Protection Agency (2002). *Legislative Authorities for Environmental Education. The Federal Government: A Draft Document of Activities and Their Authorities*. Washington, D.C.: United States Environmental Protection Agency.
- EPA - United States Environmental Protection Agency (2008). Environmental Education - Basic Information Retrieved 4/23/09, 2009, from <http://www.epa.gov/enviroed/basic.html>

- EPA - United States Environmental Protection Agency (2009). Grants Awarded since 1992 Retrieved 23 February, 2009, 2009
- Ernst, J. (2007). Factors Associated With K-12 Teachers' Use of Environment-Based Education. *Journal of Environmental Education, 38*(3), 15-31.
- Ernst, J. (2009). Influences on US middle school teachers' use of environment-based education. *Journal of Environmental Education, 15*(1), 71-92.
- Falco, E. (2004). *Environment-Based Education: Improving Attitudes and Academics of Adolescents*. Columbia, SC: South Carolina Department of Education.
- Farmer, J., Knapp, D., & Benton, G. M. (2007). An Elementary School Environmental Education Field Trip: Long-Term Effects on Ecological and Environmental Knowledge and Attitude Development. *Journal of Environmental Education, 38*(3), 33-42.
- GSA - Green Schools Alliance (2009). About Us Retrieved 17 April, 2009, 2009, from <http://www.greenschoolsalliance.org/about/index.html>
- Haney, J. J., Wang, J., Keil, C., & Zoffel, J. (2007). Enhancing Teachers' Beliefs and Practices Through Problem-Based Learning Focused on Pertinent Issues of Environmental Health Science. *Journal of Environmental Education, 38*(4), 25-33.
- Heimlich, J. E., Braus, J., Olivolo, B., McKeown-Ice, R., & Barringer-Smith, L. (2004). Environmental Education and Preservice Teacher Preparation: A National Study. *Journal of Environmental Education, 35*(2), 17-21.
- Huckle, J. (2009). Consulting the UK ESD community on an ESD indicator to recommend to the government: an insight into the micro-politics of ESD. *Environmental Education Research, 15*(1), 1-15.
- Hungerford, H. R., & Volk, T. L. (1990/2001). Changing Learner Behavior in Environmental Education. In H. R. Hungerford, W. J. Bluhm, T. L. Volk & J. M. Ramsey (Eds.), *Essential Readings in Environmental Education* (2 ed.). Champaign, IL: Stipes Publishing, L.L.C.
- Hungerford, H. R., Volk, T. L., & Ramsey, J. M. (2000). *Instructional impacts of environmental education on citizenship behavior and academic achievement*. Paper presented at the Annual Meeting of the North American Association for Environmental Education.
- Kenney, J. L., Militana, H. P., & Donohue, M. H. (2003). Helping Teachers to Use Their School's Backyard as an Outdoor Classroom: A Report on the Watershed Learning Center Program. *Journal of Environmental Education, 35*(1), 18-26.
- King, K. V., & Zucker, S. (2005). *Curriculum Narrowing*. San Antonio, TX: Pearson Education, Inc.
- Kushmeric, A., Young, L., & Stein, S. E. (2007). Environmental justice content in mainstream US, 6-12 environmental education guides. *Environmental Education Research, 13*(3), 385-408.
- Leeming, F. C., Porter, B. E., Dwyer, W. O., Cobern, M. K., & Oliver, D. P. (1997). Effects of participation in class activities on children's environmental attitudes and knowledge. *Journal of Environmental Education, 28*(2), 33-42.
- Lieberman, G. A., & Hoody, L. L. (1998). *Closing the Achievement Gap*. San Diego, CA: State Education and Environmental Roundtable.
- Mastrilli, T. (2005). Environmental Education in Pennsylvania's Elementary Teacher Education Programs: A Statewide Report. *Journal of Environmental Education, 36*(3), 22-30.
- Maurer, C. (1999). *The U.S. President's Council on Sustainable Development: A Case Study*. Washington, DC: World Resources Institute.
- Maurer, C. (1999). *Rio +8: An assessment of national councils for sustainable development* Washington, DC: World Resources Institute.
- McKeown, R. (2002). *Education for Sustainable Development Toolkit*. Knoxville, TN: Energy, Environment and Resources Center, University of Tennessee.
- McKeown, R. (2006). Approaches to Environmental and Geographical Education for Sustainability in the United States. In J. C.-K. Lee & M. Williams (Eds.), *Environmental and Geographical Education for Sustainability: Cultural Contexts* (pp. 283-296). New York: Nova Science Publishers.
- McKeown, R., & Hopkins, C. (2003). EE is not equal to ESD: Defusing the worry. *Environmental Education Research, 9*(1), 117-128.

- McKEOWN-ICE, R. (2000). Environmental Education in the United States: A Survey of Preservice Teacher Education Programs. *Journal of Environmental Education*, 32(1), 4-11.
- Meichtry, Y., & Smith, J. (2007). The Impact of a Place-Based Professional Development Program on Teachers' Confidence, Attitudes, and Classroom Practices. *Journal of Environmental Education*, 38(2), 15-31.
- Meyers, R. B., Brody, M., Dillon, J., Hart, P., Krasny, M., Monroe, M., et al. (2007). Towards creating an inclusive community of researchers: the first three years of the North American Association for Environmental Education research symposium. *Environmental Education Research*, 13(5), 639-661.
- Milton, B., Cleveland, E., & Bennett-Gates, D. (1995). Changing perceptions of nature, self, and others: a report on a Park/School Program. *Journal of Environmental Education*, 26(3), 32-39.
- Moseley, C., & Utley, J. (2008). An Exploratory Study of Preservice Teachers' Beliefs About the Environment. *Journal of Environmental Education*, 39(4), 15-29.
- NAAEE - North American Association for Environmental Education (2004). *Environmental Education Materials: Guidelines for Excellence*. Washington, DC: North American Association for Environmental Education.
- NAAEE - North American Association for Environmental Education (2004). *The Environmental Education Collection: A Review of Resources for Educators*. Washington, DC: NAAEE - North American Association for Environmental Education,.
- NAAEE - North American Association for Environmental Education (2007). *STANDARDS FOR THE INITIAL PREPARATION OF ENVIRONMENTAL EDUCATORS*. Washington, DC: North American Association for Environmental Education.
- NAAEE-SEC - North American Association for Environmental Education Sustainability Education Commission (2006). Sustainability Education Commission Retrieved 28 April, 2009, 2009, from <http://www.naaee.org/about-naaee/committees-commissions-councils/sustainability-education-commission>
- National Resources Conservation Service (1995). Administrative History of the Natural Resources Conservation Service Retrieved 16 May, 2009, 2009, from <http://www.archives.gov/research/guide-fed-records/groups/114.html#114.1>
- NEEAC - National Environmental Education Advisory Council (2005). *Setting the Standard, Measuring Results, Celebrating Successes*. Washington, D.C.: Environmental Protection Agency.
- NEETF - National Environmental Education and Training Foundation (2000). *Environment-Based Education: Creating High Performance Schools and Students*. Washington, DC: National Environmental Education and Training Foundation.
- Nolet, V. (2009). Preparing sustainably-literate teachers. *Teachers College Record*, 111(2), 409-442.
- President Obama's Remarks to the Hispanic Chamber of Commerce*, (2009).
- Orr, D. (1992). *Ecological Literacy: Education and the Transition to a Postmodern World*. Albany, NY: State University of New York Press.
- PEEC - Place-Based Education Evaluation Collaborative (2003). *Concept Paper: PEEC - The Place-Based Education Evaluation Collaborative*: PEEC - The Place-Based Education Evaluation Collaborative.
- Pleyvak, L. H., Bendixen-Noe, M., Henderson, J., Roth, R. E., & Wilke, R. (2001). Level of Teacher Preparation and Implementation of EE: Mandated and Non-Mandated EE Teacher Preparation States. *Journal of Environmental Education*, 32(2), 28-36.
- Powers, A. L. (2004). An evaluation of four place-based education programs. *Journal of Environmental Education*, 35(4), 17-32.
- Powers, A. L. (2004). Teacher Preparation for Environmental Education: Faculty Perspectives on the Infusion of Environmental Education Into Preservice Methods Courses. *Journal of Environmental Education*, 35(3-11).
- President's Council on Sustainable Development (1996). *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment for the Future*. Washington, DC: President's Council on Sustainable Development.
- President's Council on Sustainable Development (1996). *Education for Sustainability: An Agenda for Action*. Washington, DC: US Government Printing Office.
- President's Council on Sustainable Development (1999). *Toward a Sustainable America: Advancing Prosperity, Opportunity, and a Healthy Environment for the 21st Century*. Washington, DC: President's Council on

- Sustainable Development.
- Promise of Place (2009). What is Place-based Education? Retrieved 20 April, 2009, 2009, from <http://www.promiseofplace.org/>
- Rabe, B. G. (2004). *Statehouse and Greenhouse: The Emerging Politics of American Climate Change Policy*. Washington, DC: Brookings Institution Press.
- Randler, C., Ilg, A., & Kern, J. (2005). Cognitive and Emotional Evaluation of an Amphibian Conservation Program for Elementary School Students. *Journal of Environmental Education*, 37(1), 43-52.
- Reif, F. (2008). *Applying Cognitive Science to Education: Thinking and Learning in Scientific and Other Complex Domains*. Cambridge, MA: MIT Press.
- Rickinson, M. (2001). Learners and learning in environmental education: a critical review of the evidence. *Environmental Education Research*, 7(3), 207-320.
- Rode, H., & Michelsen, G. (2008). Levels of indicator development for education for sustainable development. *Environmental Education Research*, 14(1), 19-33.
- Schools, N.-N. A. o. I. (2009). Sustainable Schools for the 21st Century Retrieved 15 April, 2009, 2009, from <http://www.nais.org/sustainable/index.cfm?ItemNumber=147756>
- Shelburne Farms (2003). About Shelburne Farms Retrieved 18 April, 2009, 2009, from <http://www.shelburnefarms.org/about/index.shtm>
- Simmons, D. (1995). *The NAAEE standards project: Papers on the development of environmental education standards*. Washington, DC: North American Association for Environmental Education.
- Smith-Sebasto, N. J., & Semrau, H. J. (2004). Evaluation of the Environmental Education Program at the New Jersey School of Conservation. *Journal of Environmental Education*, 36(1), 3-18.
- Sustainable Agriculture Research and Education (2009). What is SARE? Retrieved 15 March, 2009, 2009, from <http://www.sare.org/about/>
- The Cloud Institute for Sustainability Education (2009). About Us Retrieved 12 April, 2009, 2009, from http://www.sustainabilityed.org/who/about_us/bio_cloud.html
- The College Board (2008). *The 4th Annual AP Report to the Nation*. New York: The College Board.
- USPESD - US Partnership for Education for Sustainable Development (2008). *Professional Organizations Summit Report: USPESD - US Partnership for Education for Sustainable Development*.
- USPESD - US Partnership for Education for Sustainable Development (2008). *US Partnership for Education for Sustainable Development National Education for Sustainability K-12 Student Learning Standards: USPESD - US Partnership for Education for Sustainable Development*.
- USPESD - US Partnership for Education for Sustainable Development (2009). USPESD - A Brief History Retrieved 22 February, 2009, 2009, from http://www.uspartnership.org/main/show_passage/2
- Vermont's Place and Sustainability Standards (2001).
- Volk, T. L., & Cheak, M. J. (2003). The effects of an environmental education program on students, parents and community. *Journal of Environmental Education*, 34(5), 12-25.
- VT-EFS - Vermont Education for Sustainability (2000). Education for Sustainability in Vermont - History Retrieved 24 March, 2009, 2009, from <http://www.vtefs.org/about/index.html>
- VT-EFS - Vermont Education for Sustainability (2004). *The Vermont Guide to Education for Sustainability*. Shelburne, VT: Vermont Education for Sustainability.
- Washington OSPI - Office of the Superintendent of Public Instruction (2009). Education for Environment and Sustainability - Background Retrieved 20 April, 2009, 2009, from <http://www.k12.wa.us/curriculumInstruct/EnvironmentSustainability/Background.aspx>
- Wheeler, G. (2009). Personal Communication. 24 February, 2009.
- White House Office of the Press Secretary (2009). *Fact Sheet: A Historic Commitment to Research and Education*. Washington, DC: White House Office of the Press Secretary,.
- World Commission on Environment and Development (1987). *Our Common Future*. Geneva, CH: United Nations.
- Zellmer, M. B., Frontier, A., & Pfeifer, D. (2006). What are NCLB's instructional costs? *Educational Leadership*, 64(3), 43-46.